AUGUST 26, 1996 VOLUME 13, NUMBER 35

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

NetWare meets the 'Net

Novell CEO Robert Frankenberg introduces IntranetWare.

Netscape recruits new Web app allies

By Carol Sliwa
Mountain View, Calif.

Netscape Communications Corp. next month will begin promoting a free suite of Java-based business applications — dubbed Appalanche — developed by a collection of third-party vendors, several sources confirmed.

The company last week was privately pitching 20 specialized applications, ranging from a sales trend analyzer to an expense reporting program, designed to run on its server software. Users will access the applets through their Web browsers, according to sources familiar with the plan.

Netscape's use of third-party firms as a way to validate a development platform is reminiscent of Microsoft Corp.'s strategy.

See Netscape, *page 69*

AN AVALANCHE OF APPLICATIONS

Sampling the Appalanche collection:

Vendor	Application
Acclaim Technology	Travel & expense reports
Booz, Allen & Hamilton	Decision support
Lante	Sales trend analyzer
Neoglyphics Media	Web statistics
Sage Solutions	Sales tools database
US Web	Project information manager

IP switching heats up

Start-up Ipsilon to enhance its software and back IP switching interoperability test.

By Jim Duffy

Fad or fixture?

Whatever the case, the internetworking industry is currently fixated on IP switching, a concept that marries the familiarity of IP with the raw speed and quality of service (QoS) characteristics of ATM.

Start-up Ipsilon Networks, Inc., which introduced the industry to IP switching over the winter, this week will announce enhancements to its software for guaranteeing networkwide QoS for existing IP applications.

The company is also backing an "IP Switchathon" interoperability test in North Carolina and an interoperability demonstration at next month's NetWorld+Interop 96 show in Atlanta.

In addition, Ipsilon will roll out a modular version of its IP Switch Gateway that connects Fast Ethernet LANs to its IP Switch.

Ipsilon's *Larry Blair says about 20 vendors will test IP switch interoperability.*

But Ipsilon is not alone in addressing this market.

Cisco Systems, Inc., which introduced NetFlow Switching in April shortly after Ipsilon made its debut, is now planning to increase the switching performance of its 7500 backbone router. The company is adding higher capacity processors to 7500 interface cards, and upgrading the router's main CPU, said Richard Palmer, Cisco director of mar-

See Ipsilon, *page 68*

HOW VENDORS ARE ADDRESSING IP TRAFFIC JAMS

Bay – Developing Layer 3 switching software for its Centillion switches.

Cabletron – Offering SecureFast Virtual Networking Services for establishing connection-oriented virtual circuits.

Cisco – Providing NetFlow Switching, an IP router enhancement.

Ipsilon – Delivering IP switches based on ATM hardware.

3Com – Improving performance and scalability of routers, possibly via a switching matrix.

Cisco to help users get arms around IP networks

By Jim Duffy
San Jose, Calif.

Cisco Systems, Inc. this week will enter the IP name and address management market with a product designed to help customers better handle large TCP/IP networks.

The company will roll out DNS/DHCP Manager, software for administration of Dynamic Host Configuration Protocol (DHCP) and Domain Name Service (DNS) servers. DHCP servers are used to assign a computer an IP address from a pool of available addresses, whereas DNS servers attach a name to that address.

To date, there is no standard method for linking and automatically updating DHCP and DNS servers. Instead, users have to manually predefine static name and address linkages or avoid this process altogether.

"TCP/IP can be pretty com-

See Cisco, *page 14*

Visit Network World Fusion for more info about IP address management, including:

- White papers and primers on TCP/IP and IP address management
- A look at Isotro's NetID IP administration software
- Details on Quadritek's QIP system

Network World Fusion

Select News+.

NEWSPAPER $5.00

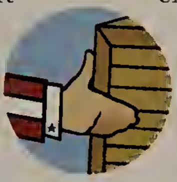
T00

Access Network World Fusion using the number in yellow. See page 5 for details.

Key-escrow firewall ready to leave the country

By Ellen Messmer
Washington, D.C.

After months of talk about exporting encryption software, there will finally be action.



Fulfilling the Clinton Administration's vow to end export restrictions on strong encryption products if they use key-escrow features, the U.S. government this week is expected to permit Trusted Information Systems, Inc. (TIS) to sell its Data Encryption Standard (DES)-equipped Gauntlet firewall overseas.

Such exports will allow U.S.-based companies to standardize on an encrypting firewall for all global operations.

The Department of Commerce is granting mass-market export status to a specific version of the Gauntlet firewall based on

See Encryption, *page 68*

In-Site

Frame relay gives Bassett healthy return

By David Rohde
Cooperstown, N.Y.

Tired of high and rising long-distance rates for branch locations that cannot afford dedicated access lines? Then do what Joe Middleton did and cut the phone company out of the picture.

Middleton, vice president of systems support for Bassett Healthcare Corp., has taken the idea of aggregating branch office voice traffic onto a private frame relay/ATM network to a new level. Instead of just transporting intracompany phone calls over the data network, Bassett directs its off-net long-distance traffic onto the private net, as well.

The company collects this traffic at its host site via the data net and puts it on dedicated access lines to regional long-distance carrier Citizens Telecom. This eliminates the need for long-distance phone calls to traverse switched access lines from NYNEX Corp. or other local exchange carriers (LEC) before hitting the long-distance network.

And that saves money. According to the

See Bassett, *page 69*

"We're essentially running our own telephone company."

Joe Middleton, vice president of systems support, Bassett Healthcare Corp.

www.ascend.com

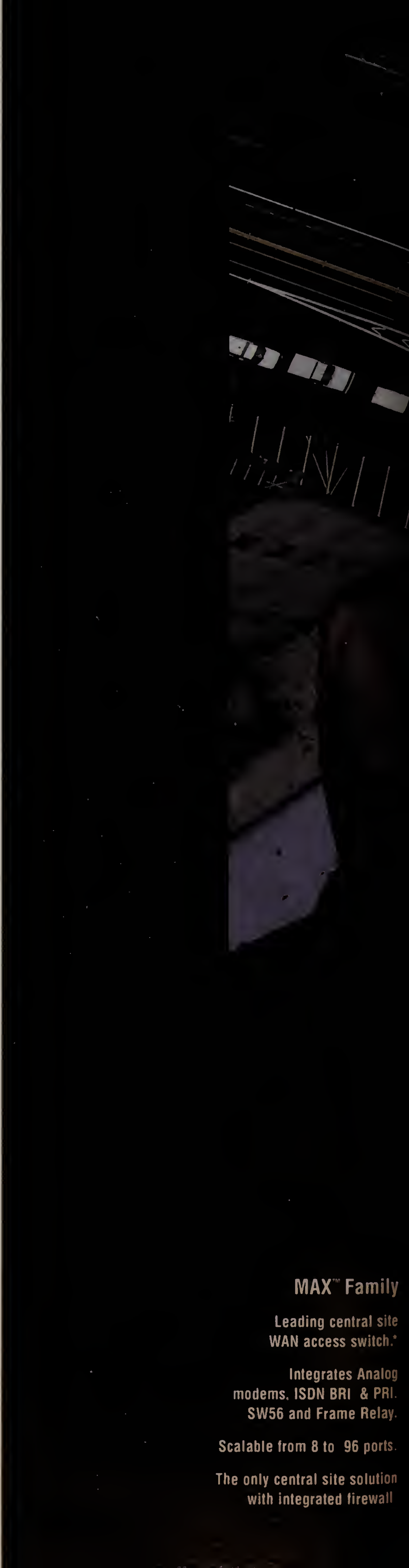
If you didn't buy Ascend's products with built-in firewall security, there are other steps you could take.

Choosing the wrong remote access products can be a fatal mistake. Only Ascend's leading remote access solution with integrated Secure Access™ Firewall can protect your entire company. And only Ascend can do it right now. From the corporate level to the remote user to the telecommuter, advanced firewall security keeps every site safe. Security is transparent to users and unauthorized users are completely restricted. Plus, it's all managed and configured from one central site, and compatible with most ISPs. Call now. The job you save may be your own.

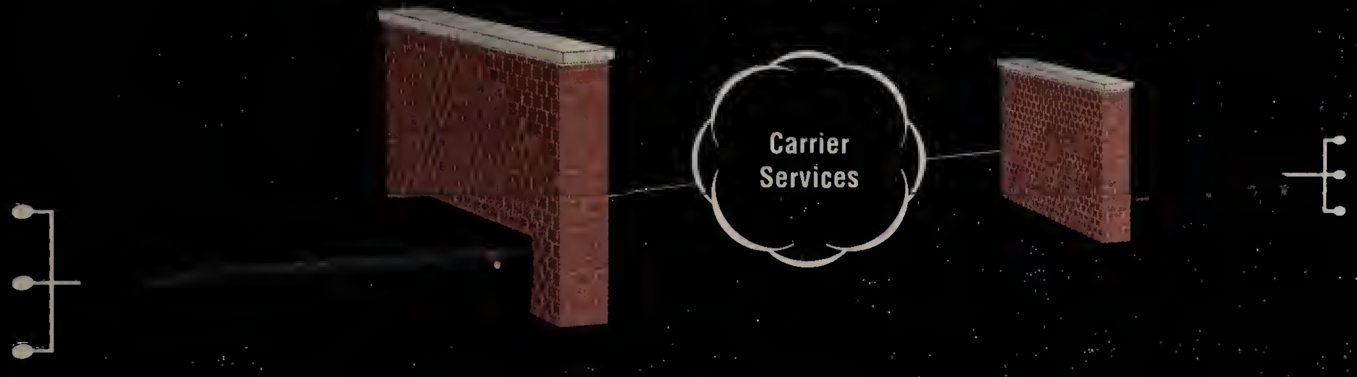
**For your free copy of "Access Denied:
The Benefits of Integrated Security"
Call 1-800-632-8347 ext. 407**

**Remote Networking
Solutions That Work.™**

ASCEND


MAX™ Family
Leading central site WAN access switch.*
Integrates Analog modems, ISDN BRI & PRI, SW56 and Frame Relay.
Scalable from 8 to 96 ports.
The only central site solution with integrated firewall

©1996 Ascend Communications, Inc. Ascend, the Ascend logo, MAX, Pipeline and Secure Access are registered trademarks of Ascend Communications, Inc. *Based on number of access concentrators sold. Dell'Oro Market Research Group, 1996



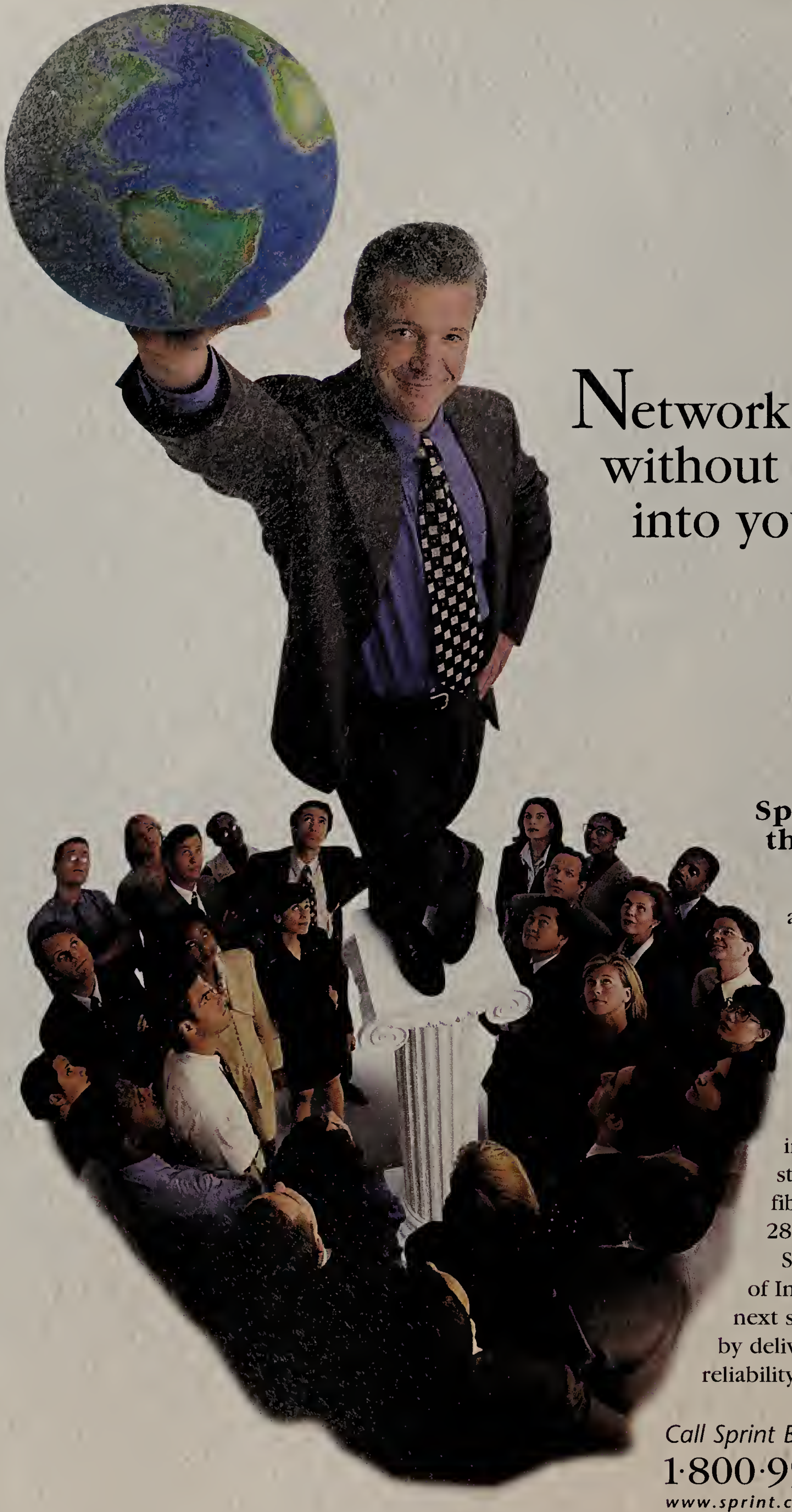
Pipeline™ Family

Award-winning remote access solution.

Integrates Analog, ISDN BRI, SW56 and Frame Relay network services.

Includes Ascend's Dynamic IP addressing for Internet Access.

The only remote site solution with integrated firewall.



Network with the world without the world getting into your network.

Sprint's discrete network offers the ultimate in intranet security.

Sprint's built an intranet network that's head and shoulders above the competition. It's the only separate IP network dedicated exclusively to corporate intranets–not the public Internet. So your employees, customers and business associates can access your corporate data with complete security and confidence, from anywhere in the U.S.

Sprint installs, monitors and manages your intranet 24 hours a day. Using the TCP/IP standard, your data travels over an all digital, fiber optic network at dial speeds up to 28.8 kbps and dedicated speeds up to DS3.

Sprint's already the world's leading carrier of Internet traffic. And now, we've taken the next step to put your intranet above the crowd, by delivering the security, performance and reliability your business needs.

Call Sprint Business
1·800·993·7325
www.sprint.com/ip

Sprint®

We help business do more business℠

OFFICIAL
TELECOMMUNICATIONS
PROVIDER TO THE NFL

© 1996 Sprint Communications Company L.P. The NFL and the shield are registered trademarks of the National Football League.

NetworkWorld Fusion

http://www.nwfusion.com

This Week

News+

- **The Industry Watch section** now features financial news about networking companies and a new stock-quote service courtesy of Quote.com. You can set up a portfolio to be tracked automatically, or see how various industry groups and indexes, including networking, software and the Internet, are doing on a daily or even minute-by-minute basis.
- **IP address management:** Cisco enters the IP name and address management market; read more about Cisco's new product and its competitors.
- **Server applications:** Check out how Netscape is trying to bury Microsoft with a free suite of Java-based business applications.
- **Voice over frame relay:** Learn how companies are finding unique ways to implement this burgeoning technology.
- **Exporting encryption:** Find links for discussion and debate of this controversial topic. Read about the ramifications of the U.S. government's decision.
- **Internetworking:** Explore the intensifying competition between Cisco and Ipsilon Networks in the IP switching market.
- **Operating systems:** Look back on the year that was for Windows 95 and the threat it faces on the corporate desktop from its sibling system, Windows NT 4.0.

NetRef

This week, we compare the costs of low-end routers vs. modems (p. 43). Download low-end router product information in Product Reviews/Buyer's Guides.

this week's pick

Looking for a search engine with a human face? Then drop by to see the people at PHOAKS (People Helping One Another Know Stuff). PHOAKS staffers comb through thousands of newsgroup postings and tally web resource links that appear in those messages. It's at http://weblab.research.att.com/phoaks.

HOW TO GET ON TO NETWORK WORLD FUSION

At the welcome screen, click on Registration and follow the instructions. Subscribers, keep your NWF number — highlighted on the front cover's mailing label — handy during registration. Non-subscribers must fill out an online registration form.

NetworkWorld Fusion PICK OF THE WEEK

Hot Topic Dave Kearns looks back on Win95 one year later (page 28). Let him know if you agree. Select Forum, then Columns and then Wired Windows.

NetworkWorld
An IDG Publication

Contents

News

6 **Lotus rolls out** a revamped version of cc:Mail for client/server nets.
6 **Infinite Technologies sees** unlimited E-mail potential.
8 **Ascom BroadNet proposes** 1.25G bit/sec ATM to unclog Internet.
8 **Microsoft forges** application security partnerships.
10 **AT&T President Alex Mandl** calls it quits.
10 **SunSoft delivers** Java Workshop for building 'Net applications.
10 **IBM and Sun** make news at Object World.
14 **Start-up Vienna breaks** new ground.
14 **SAP to recast** its client/server applications.
15 **Data General to ship** aggressively priced Pentium Pro server.

WANs & Internetworking

17 **OnStream offers** inexpensive T-1 ATM inverse multiplexing module.
17 **Router prepped** for multimedia duties.
18 **Let your browser** do the walking.

Carrier Services

21 **GTE and Microsoft** check out ADSL together.
21 **Ameritech adds** leading performance measurement tool to managed frame relay service.

SPECIAL FOCUS

Global Internet

International 'Net services aren't perfect, but help is on the way.

See page 24.

Local Networks

25 **Windows 95 turns 1,** but how long will it survive?
25 **HP rounds out** its Pentium Pro server line.

Client/Server Applications

33 **Simba's ODBC middleware** simplifies data access.
33 **Diamond Head unwraps** its imaging and workflow components suite version that supports ActiveX.

Intranets & the 'Net

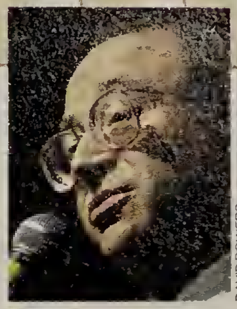
37 **Express makes Web** fit for clothing sales.
37 **Netscape to flood** your in-box with all the news that's fit to transmit.

Technology Update

39 **Hear me now:** voice over ATM.

Management Strategies

53 **Good testing procedures** produce sound results.

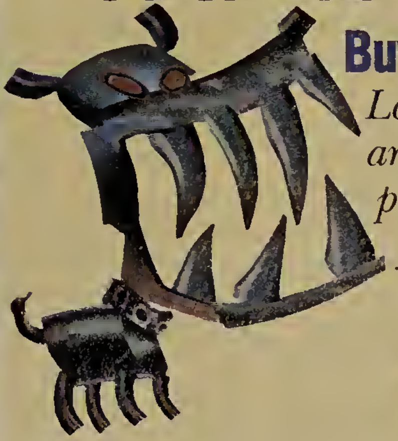

DAVID POWERS

Novell's *Markman says additional intranet services will be released soon. Page 8.*

Opinions

22 **Daniel Briere and Christine Heckart** pass the reigns to newcomer **Cathy Gadecki** who plugs ATM.
28 **Dave Kearns** says Windows 95 looks good in '96.
31 **Skip MacAskill and Melinda Le Baron** question whether Gigabit Ethernet will really take over the world.
36 **Marc Myers** examines Web security issues in light of recent events at the Justice Department.
40 **Editorial:** Novell serves up an ace.
40 **Linda Musthaler** says GroupWise 5 will redefine the groupware marketplace.
41 **Natalie Winnett** claims users aren't diving into Ethernet switching.
70 **Dave Buerger:** Execs dreaming of riches put product quality at risk.
70 **Mark Gibbs:** Why computer systems are bad at the stuff they are supposed to be good at.

Features



Buyer's Guide: *Low-end routers are looking to put the bite on your modems.* *Page 43.*

NetworkWorld TEST ALLIANCE

Review: *Faxtastic! Four promising fax server options for Windows NT servers.* *Page 49.*

Network Help Desk. *Page 39.*
Message queue. Letters to the editor. *Page 41.*
Editorial and advertiser indexes. *Page 67.*

NetworkWorld's *Mission: To provide news and analysis that help network IS professionals deliver the network computing infrastructure and distributed applications required to meet evolving business needs.*

News briefs, August 26, 1996

Lucent to buy Bay?

Speculation ran rampant last week that Lucent Technologies, Inc. wants to acquire Bay Networks, Inc. for $40 per share, a 58% premium on Bay's closing price of 25-1/4 last Thursday. Analysts see it as a good buy for Lucent because Bay's hubs and routers would help Lucent become a force in enterprise networking. "You can't be a big player if all you are is a glorified integrator," said Thomas Nolle, president of CIMI Corp. in Voorhees, N.J. "The fit is just too perfect." Bay has been struggling of late and is searching for a new chief executive officer. Analysts said Lucent wants to make its offer before NetWorld+Interop 96, which is in three weeks. Bay and Lucent declined to comment.

Microsoft gains CIFS supporters

Microsoft Corp. is making headway in getting its Common Internet File System (CIFS) protocol accepted as a standard for remote file sharing over the Internet and corporate intranets. More than 40 companies — including AT&T, Apple Computer, Inc., Digital Equipment Corp., Hewlett-Packard Co., IBM and Sun Microsystems, Inc. — will join Microsoft in Redmond, Wash., this week to participate in the first technical review workshop on the proposed CIFS specification, a draft of which Microsoft has already submitted to the Internet Engineering Task Force.

On top of the World-Wide Web

Jean-Francois Abramatic, head of the French research firm Institut National de Recherche en Informatique et en Automatique (INRIA), has been officially named sole chairman of the World-Wide Web Consortium (W3C). Previously, Abramatic shared the position with Albert Vezza, associate director of the Massachusetts Institute of Technology Lab for Computer Science in Cambridge, Mass. Vezza is retiring from MIT.

Boundless energy

In one fell swoop, Sun River Corp. this week will change its name to Boundless Technologies, Inc. and introduce three network computers (NC) designed to access Internet and Windows applications. The company said the new name better reflects its focus on providing low-cost access to any network resource via a line of terminals and newfangled thin-client computers. Its flagship Boundless NC XL features an Intel i960 RISC processor, as much as 32M bytes of dynamic RAM, multimedia support and software suites for Windows and Java applications. The XL machines are priced starting at $799.

Oracle buys into ATM

Oracle Corp. has invested $10 million in U.K.-based Advanced Telecommunications Modules, Ltd. (ATML), according to IDG News Service sources. ATML, spun off from Olivetti Research Laboratories two years ago, designs, manufactures and sells low-cost, high-speed networking equipment based on ATM technology. Oracle and ATML officials were not available for comment. The move is seen by analysts as part of Oracle's commitment to the network computer (NC) platform.

"If Oracle [is] serious about delivering video, audio and multimedia content over the NC platform, then ATM to the desktop seems the only realistic delivery mechanism," said Eric Owen, senior analyst with market researcher International Data Corp. in London.

Powersoft makes NetImpact

Powersoft Corp. last week announced the pending release of NetImpact Studio, the debut of its application development tools for the Web and corporate intranets. NetImpact Studio will enable developers to design, test and build Web applications using HTML, JavaScript, components and SQL or procedural application servers, the company said. Beta testing is scheduled for the fourth quarter.

Lotus rolls out cc:Mail 7

Lotus' popular mail package appears to be here to stay.

By Barb Cole

Cambridge, Mass.

Don't write off Lotus Development Corp.'s cc:Mail yet.

The company last week announced an upgrade of the mail system that looks more like Notes, finally exploits client/server nets and will soon support a breadth of Internet protocols.

Lotus cc:Mail Release 7 clients may run against older style file-sharing cc:Mail Post Offices, Notes servers or any mail servers that support Microsoft's Messaging Application Programming Interface (MAPI). But the Notes back end is what turns cc:Mail into a true client/server messaging system, and should boost performance and scalability.

The decision to boost the capabilities of cc:Mail may be a result of a slower than expected migration from the legacy mail system to Notes, analysts said. And giving loyal cc:Mail users what they want may further delay their move to Notes.

"In the past, it was quite clear that you wanted to move [to Notes]," said Matt Cain, an analyst at META Group, Inc. in Stamford, Conn. That is less clear now that Lotus is beefing up the reliability of cc:Mail and turning it into a client/server mail system, he said.

Ready to POP

Another cc:Mail revision, due in 1997, will support a variety of Internet protocols, including Post Office Protocol Version 3, Internet Messaging Access Protocol Version 4, Lightweight Directory Access Protocol, Internet Calendaring Access Protocol and Network News Transport Protocol.

Despite the enhancements, cc:Mail is still no Notes. Michael Sullivan Trainor, an analyst at International Data Corp. in Framingham, Mass., pointed out that cc:Mail is still just messaging, while Notes has a much higher level of functionality. "This cc:Mail release is really aimed at keeping the installed base happy so they don't move to Exchange or Netscape's mail server," he said.

The new version of cc:Mail has a revamped user interface that now closely resembles Notes and makes it easier to handle large volumes of E-mail, according to Larry Jones, director of marketing at Lotus. For example, users now have more choices in the way they store messages and may scan mail without opening it.

The numbers on cc:Mail

1995 revenues:
$80 million

Mailboxes shipped in 1995:
2.5 million

Total installed mailboxes:
8.8 million

SOURCE: IDC, FRAMINGHAM, MASS.

Ironically, the latest Notes Mail interface itself borrowed liberally from cc:Mail's three-pane view. The company has also improved support for mobile cc:Mail users by adding fully automatic synchronization between mobile and LAN-based mailboxes.

A lot of diehard cc:Mail users remain committed to the product and applauded the upgrade.

"I consider this release a major improvement because it's effectively client/server," said Bob Davis, director of development at London-based Davis Communications, Ltd., which provides dial-in access to a public cc:Mail network.

The new architecture will take the load off the LAN and make the database more secure, according to Davis.

"[Moving to Notes] is a big step that we're not ready to make," said Paul Badowski, network and mail administrator for Belcan Engineering in Cincinnati, which has about 600 cc:Mail seats. "There are a lot of changes that need to take place within the infrastructure [to support Notes]," he said.

Release 7 of cc:Mail will be available for Windows 95 and Windows NT in October, and for Windows 3.1 by year-end. Pricing is $55 per user for volume purchases.

©Lotus: (617) 577-8500.

Small mail firm makes 'Net play

By Barb Cole

Owings Mills, Md.

The big guys can't do everything. With that in mind, a small messaging firm will roll out a spate of new products next month that fill gaps in mainstream messaging systems.

Infinite Technologies, Inc. offerings take aim at improving the remote and Internet capabilities of LAN-based E-mail systems.

The announcements will be made at the NetWorld+Interop 96 show in Atlanta.

The new products include Infinite InterChange, server-based software that lets users access their LAN-based mail systems remotely via Post Office Protocol Version 3 and Internet Messaging Access Protocol Version 4. InterChange also includes the company's ExpressIT 2000 mail client, but the software can also be used to add remote capabilities to existing mail clients.

Infinite InterChange also acts as a Network News Transport Protocol server, providing access to Internet newsgroups as well as newsgroups on private nets.

InterChange software runs on Windows 95 and Windows NT, and supports systems based on Microsoft's Messaging Application Programming Interface, Simple Mail Transport Protocol, Vendor-Independent Messaging and Message Handling System (MHS).

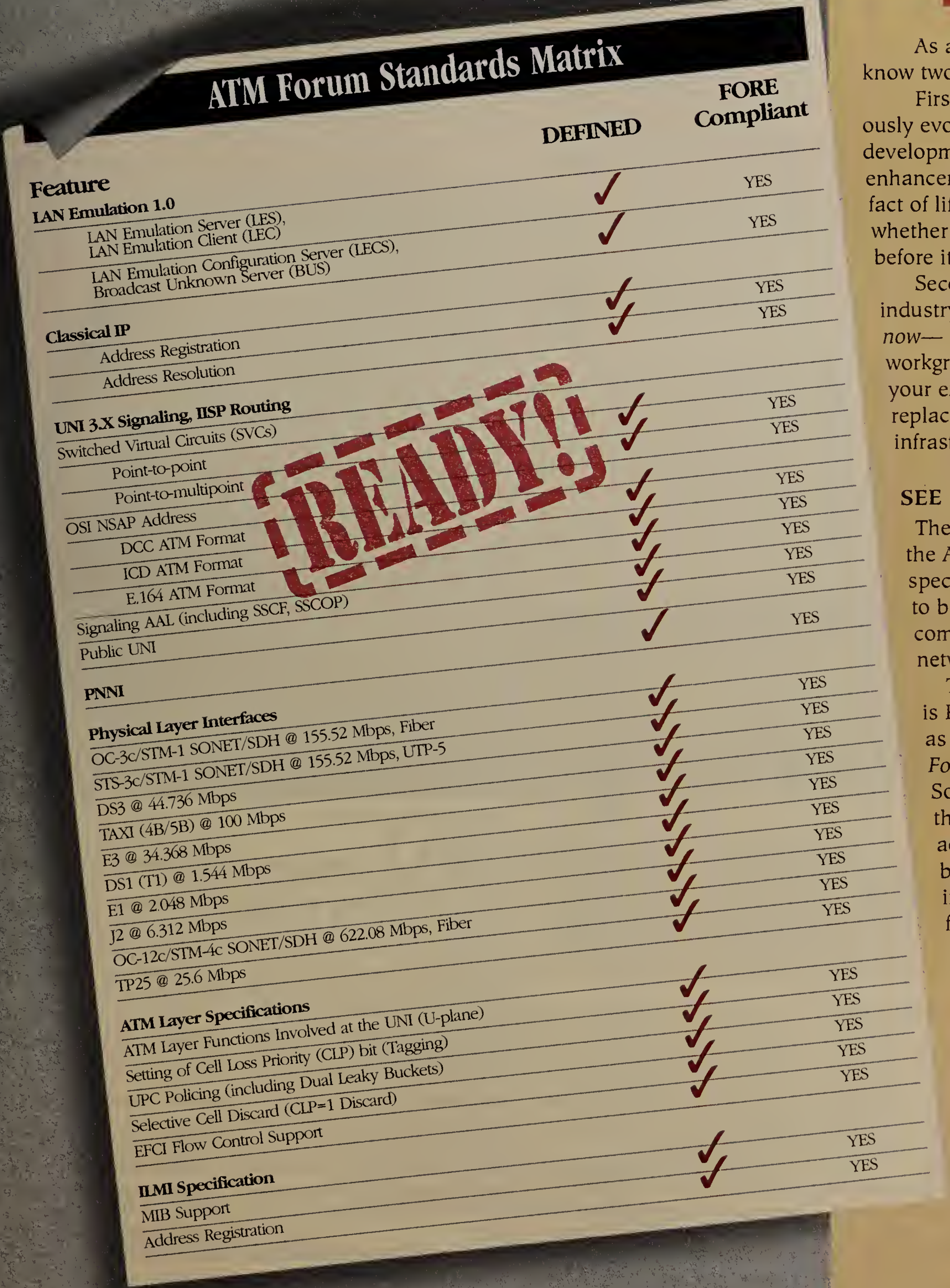
The ability to access mail systems remotely — particularly from corporate intranets and the Internet — is becoming essential. Today, some LAN-based systems require a special remote

See **Infinite**, *page 15*

HOW TO REACH US

CALL: (508) 875-6400; **FAX:** (508) 820-3467; **INTERNET:** nwnews@nww.com; **WRITE:** Network World, 161 Worcester Rd., Framingham, MA 01701; **NETWORK HELP DESK:** Having trouble resolving a technical problem, locating resources or getting a vendor to follow up on a promise? Call (800) 622-1108, Ext. 451, or cnerney@nww.com; **SUBSCRIPTIONS:** nwcirc@nww.com; **REPRINTS:** In quantities of 500-10,000. Call (612) 582-3800. **MARKET LINE:** For details about future editorial projects, call (508) 820-7557.

ATM STANDARDS
READY, SET, GO!



ATM Forum Standards Matrix

Feature	DEFINED	FORE Compliant
LAN Emulation 1.0		
LAN Emulation Server (LES), LAN Emulation Client (LEC)	✓	YES
LAN Emulation Configuration Server (LECS), Broadcast Unknown Server (BUS)	✓	YES
Classical IP		
Address Registration	✓	YES
Address Resolution	✓	YES
UNI 3.X Signaling, IISP Routing		
Switched Virtual Circuits (SVCs)		
Point-to-point	✓	YES
Point-to-multipoint	✓	YES
OSI NSAP Address		
DCC ATM Format	✓	YES
ICD ATM Format	✓	YES
E.164 ATM Format	✓	YES
Signaling AAL (including SSCF, SSCOP)	✓	YES
Public UNI	✓	YES
PNNI	✓	YES
Physical Layer Interfaces		
OC-3c/STM-1 SONET/SDH @ 155.52 Mbps, Fiber	✓	YES
STS-3c/STM-1 SONET/SDH @ 155.52 Mbps, UTP-5	✓	YES
DS3 @ 44.736 Mbps	✓	YES
TAXI (4B/5B) @ 100 Mbps	✓	YES
E3 @ 34.368 Mbps	✓	YES
DS1 (T1) @ 1.544 Mbps	✓	YES
E1 @ 2.048 Mbps	✓	YES
J2 @ 6.312 Mbps	✓	YES
OC-12c/STM-4c SONET/SDH @ 622.08 Mbps, Fiber	✓	YES
TP25 @ 25.6 Mbps	✓	YES
ATM Layer Specifications		
ATM Layer Functions Involved at the UNI (U-plane)	✓	YES
Setting of Cell Loss Priority (CLP) bit (Tagging)	✓	YES
UPC Policing (including Dual Leaky Buckets)	✓	YES
Selective Cell Discard (CLP=1 Discard)	✓	YES
EFCI Flow Control Support	✓	YES
ILMI Specification		
MIB Support	✓	YES
Address Registration	✓	YES

READY!

FORE

As a network manager, you need to know two things about ATM standards.

First, ATM standards are continuously evolving to keep pace with the development of new ATM network feature enhancements. Evolving standards are a fact of life for any healthy technology, whether it's ATM or others that have gone before it, such as IP.

Second, and more importantly, ATM industry standards are ready— right *now*— for you to build an ATM workgroup or backbone, and connect your existing network. Today. Without replacing your current network infrastructure.

SEE FOR YOURSELF

The Anchorage Accord developed by the ATM Forum, provides specifications for everything you need to build an ATM internetwork compatible with your installed networking equipment.

These standards are firm, and so is FORE's compliance with them— as detailed in this checklist for our *ForeThought*™ 4.0 Internetworking Software. What's more, FORE goes the extra step by offering the value-added features that allow you to build an even more robust ATM internetwork— today. Without a forklift upgrade.

Join thousands of other organizations who are increasing productivity, reducing network costs and gaining a competitive advantage through FORE ATM.

To obtain a copy of the standards checklist, future standards updates and a free copy of, *"A Guide to ATM Data Networking"*, contact us at 1-888-404-0444.

A Principal Member of

The ATM Forum

FORE SYSTEMS

*Circle Reader Service #***57**

174 Thorn Hill Rd., Warrendale, PA 15086-7535 Phone: 1-888-404-0444 Fax: 412-635-3625 Internet: info@fore.com or http://www.fore.com

Novell puts intranet in a big red box

IntranetWare bundle to include NetWare 4.11, Web Server 2.5 and multiprotocol routing.

By Christine Burns
Burlingame, Calif.

Novell, Inc. last week made its formal entrance into the intranet market.

Top-level officials assembled here to unveil plans to bundle the company's existing Web tools and services with NetWare 4.11, add some TCP/IP ties and wide-area routing, and package it in a single red box to give its installed base a simple way to ease their client/server LANs onto the intranet.

"We have 55 million users out there that want an architecture that encompasses everything that Web technology can give them without sacrificing what they already have," said Novell Chief Executive Officer Robert Frankenberg.

IntranetWare, which will ship in October, is an intranet server software platform that builds on the distributed services of NetWare 4.11, formerly code-named Green River. The product will ship with Novell's Web Server 2.5, and includes a license for Netscape Communications Corp.'s Navigator and several undisclosed Web authoring tools. For connectivity, IntranetWare will include a gateway between TCP/IP and Novell's proprietary IPX, and a multiprotocol router for wide-area network and Internet links.

Pricing will be announced next month at NetWorld+Interop 96 in Atlanta.

Industry observers applauded Novell's effort to offer its customers an intranet migration path in one box. However, they questioned the feasibility of Novell selling the product beyond its installed base.

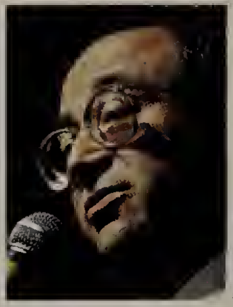
"Everything in IntranetWare is proven technology, so bundled together they might be a nice low-end solution for NetWare users," said Dave Cappuccio, vice president and research director for network computing at Gartner Group, Inc. in Stamford, Conn.

Inside IntranetWare

Novell has packaged all its Web services in one box to provide customers with an easy migration path from existing LANs to corporate intranets. Components include:

- NetWare 4.11 (formerly Green River) distributed file, print and directory services
- Web Server 2.5, browser and authoring tools
- An IPX/SPX-to-IP gateway
- Multiprotocol routing
- User and group-level security via ties to Novell Directory Services

"But the biggest problem Novell is going to have is gaining the mind share of people who are looking at Windows NT, which is a great applications platform with free intranet services. While the pieces of IntranetWare are proven technologies, I don't think Novell is going to be able to convince those potential customers of the value-add for the added price,"Cappucio said.


David Powers

Novell's *Markman says more intranet services are on the way.*

"There is no bleeding-edge technology in this package, but it is going to be a good product for smaller NetWare shops," said Rick Villars, director of network software research at International Data Corp. in Framingham, Mass. Large NetWare users will likely have intranet implementations that comprise higher performance Web products from various vendors, he added.

Dan Blevans, a technical analyst with Hallmark Corp. in Kansas City, Mo., who oversees 6,000 NetWare users at various worldwide sites, said his company probably will only install IntranetWare in some smaller offices.

"But our overall intranet strategy of tying all those sites together will more likely be based on a Unix platform, not NetWare," Blevans said.

Steve Markman, executive vice president of product marketing at Novell, detailed additional intranet services Novell will deliver over the next 18 months.

Markman said Novell will ship a proxy server with high-performance caching capabilities by year-end. By the second half of 1997, the company will roll out a multilingual search engine based on technology acquired from WordPerfect Corp.

And by the end of next year, Markman said, Novell's suite of intranet products will include firewall services and support for virtual private networks over public data lines.

Markman stressed that, in addition to helping NetWare users migrate to intranets, Novell will eventually make IntranetWare run across multiple operating systems platforms such as Windows NT and different flavors of Unix from Hewlett-Packard Co., and The Santa Cruz Operation, Inc.

Senior Editor Barb Cole contributed to this story. ■

Wide-area connections at gigabit plus

By Tim Greene
and Joanie Wexler

An ATM fiber-ring architecture that leapfrogs current ATM speeds will be introduced to the U.S. next month at NetWorld+Interop 96. This offering is being pitched as a solution for bandwidth bottlenecks faced by Internet service providers.

ATM LightRing can deliver ATM at 1.25G bit/sec and at a price dramatically below the cost of Synchronous Optical Network (SONET) rings, according to Ascom BroadNet, a new Ascom unit established to sell LightRing.

Positioned physically as nodes on a dual optical fiber ring, ATM LightPath acts logically as a fully meshed network.

The architecture, designed for campuses and tested at Cambridge University in England last year (*NW*, Dec. 11, 1995, page 6), will allow Internet Service Providers and others to run ATM at speeds much higher than those specified by ATM Forum standards. By the end of next year, LightRing will deliver 5G bit/sec, the company said.

InterNex Information Services, an 18-month-old ISP in Santa Clara, Calif., has been testing two ATM LightRings as part of a feverish quest to stay ahead of its capacity demands, according to Marcos Della, director of engineering.

The 45M bit/sec ATM links the ISP runs today off Cascade Communications Corp. 500 ATM backbone switches are getting strained, particularly in the San Francisco Bay and Los Angeles areas, he said.

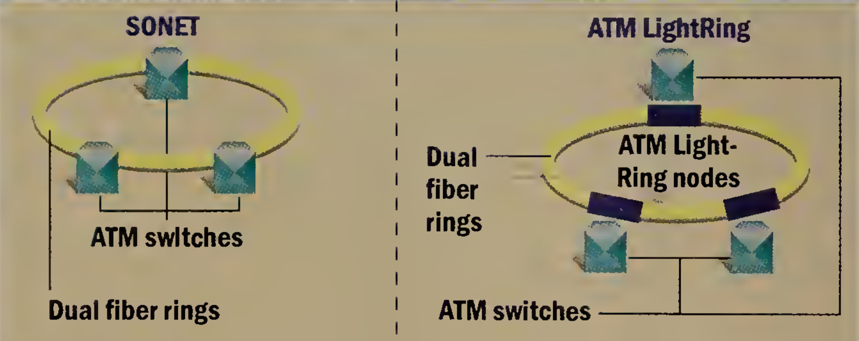
What is attracting InterNex to the LightRing network are the following factors:

■ The price of the switch — around $80,000 — compares favorably with the minimum $250,000 ATM backbone switches from other vendors that run at lower speeds.

■ The devices run on dark fiber — fiber already in the ground that Della said he can rent between San Francisco and San Jose, Calif., for about $10,000 per month to support 10 to 20 T-3s' worth of traffic. By contrast, a single T-3 leased from Pacific Bell would cost $6,000.

Each ATM LightRing node supports as many as four interface cards, including OC-3c, DS-3 and E-3 ATM interfaces. Non-ATM interfaces are T-1 and E-1.

Pumping gigabits through optical nodes



A typical SONET ring configuration involves overhead that reduces payload, and speed is limited by the switches.

Ascom BroadNet's ATM LightRing nodes support native ATM cells over a fiber ring, eliminating SONET overhead. It also sorts cells, lightening the load on the switch and increasing speed on the fiber backbone.

The nodes also support call control, policing, congestion control, traffic shaping and multiple qualities of service. They can support 64,000 switched or permanent virtual connections simultaneously.

Pricing for each node ranges from $60,000 to $90,000, depending on configuration, and they are available immediately.

Acclaim Technology, Inc., a systems integrator in San Jose, will be Ascom's primary value-added reseller for ATM LightRing. ■

Microsoft partners on security

By Elinor Mills
San Francisco

Microsoft Corp., Security Dynamics Technologies, Inc. and its subsidiary RSA Data Security, Inc. last week announced a set of cross-licensing agreements that will give developers access to one standard API for creating software with encryption capabilities.

Under the agreements, Microsoft will license its CryptoAPI to RSA for use in RSA's BSAFE tool kit, which will allow developers to create CryptoAPI-compatible applications for Windows platforms. RSA will, in turn, make the cryptographic technology available on a variety of platforms as well as further develop cryptographic engines for CryptoAPI.

RSA also will provide additional licensing rights to Microsoft for its RSA encryption algorithms, which serve as the cryptographic engine in CryptoAPI.

In addition, Microsoft will license Security Dynamics' SecurID hardware tokens and ACE/Server authentication products for use in future versions of Windows NT and Microsoft Internet Information Server (IIS).

Security Dynamics will also provide secure Internet access to selected Web pages on Microsoft's IIS. Security Dynamics currently ships hardware and software products, including ACE/Client for Windows NT, SecurID hardware tokens and ACE/Server authentication software.

CryptoAPI 2.0, the next version, will include support for digital IDs and public key cryptography, a Microsoft spokesman said.

"This is an area that is going through a lot of change right now as the industry consolidates on a set of strong security standards," said Rob Enderle, an analyst with Giga Information Group, Inc. in Santa Clara, Calif.

"So broad licensing and agreements with Microsoft really accelerate the potential for having something meaningful and secure for online commerce, " he said.

Mills is an IDG News Service correspondent in San Francisco.

It's About Power and Flexibility.

Performance and AFFORDABILITY.

It's about building a switched LAN Infrastructure.

And it's from the leader in end-to-end information access solutions.

The more critical communications become, the harder it is for a LAN to keep up. More users and more bandwidth-intensive applications create heavier network traffic demands. TOTALswitch,™ the full-featured Ethernet switch, provides high-performance switch functionality at a price competitive with shared LAN hubs. Dedicated bandwidth on every port relieves network congestion. An onboard switch engine maximizes performance levels and is easily programmable to add new features and standards. Its modular design offers investment-protecting expandability from 2 to 32 ports. And because TOTALswitch works with all Ethernet cable types, no changes are required in cabling, workstation adapters or workstation software. TOTALswitch gives you the power to access a future without limits.

U.S.Robotics®

The Intelligent Choice in Information Access

NETWORK SYSTEMS DIVISION

Lan Infrastructure Products Group

1.800.877.7533 ext. 6974

http://www.usr.com/business

LLOYD'S REGISTER QUALITY ASSURANCE ISO9001

REMOTE LAN ACCESS • ISDN • LAN SWITCHING • TRANSACTION PROCESSING • FRAME RELAY • TELEPHONY PRODUCTS • MODEMS • WIRELESS ACCESS • SOPHISTICATED NETWORK MANAGEMENT

© 1996, U.S. Robotics, Inc. All rights reserved.

Circle Reader Service #**50**

Loss of Mandl a blow to AT&T

By Joanie Wexler and David Rohde

Alex Mandl added to the turmoil already bubbling within AT&T when he resigned as company president and chief operating officer last week to take over as the head of a wireless start-up company.

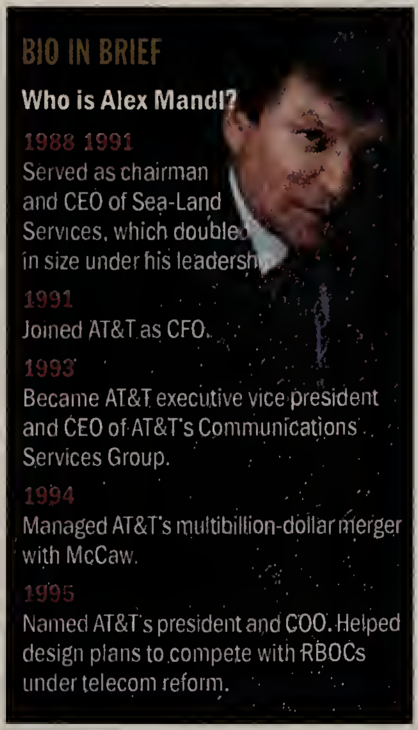
The architect of AT&T's 1994 $12.6 billion acquisition of McCaw Cellular Communications cleaned out his desk at a time when AT&T can ill afford more shakeups. Not only is the company still sorting out its reorganization into three firms, but it is planning layoffs of 40,000 workers and fighting off resellers that are nibbling away at its market share.

In becoming chairman and chief executive officer of Associated Communications, L.L.C., a wireless local bypass firm based near Washington, D.C., Mandl is taking with him a management style that has fueled a sense of competitiveness at AT&T.

The corporate agility Mandl has inspired in his five-year stint with AT&T — the past 10 months as president and COO — has enabled the company to successfully take on MCI Communications Corp. and a boatload of new rivals, observers said.

His departure is a blow to AT&T, which does not need any more organizational upsets to deflect its focus from customers, said Jeffrey Kagan, president of Kagan Telecom Associates, a consulting firm in Atlanta.

Because of the various internal distractions at AT&T of late, Kagan said customers are perceiving the carrier to be less customer-sensitive than usual. He advises customers considering new AT&T services to check with other companies of the same size to compare service levels.



BIO IN BRIEF

Who is Alex Mandl?

1988 1991
Served as chairman and CEO of Sea-Land Services, which doubled in size under his leadership.

1991
Joined AT&T as CFO.

1993
Became AT&T executive vice president and CEO of AT&T's Communications Services Group.

1994
Managed AT&T's multibillion-dollar merger with McCaw.

1995
Named AT&T's president and COO. Helped design plans to compete with RBOCs under telecom reform.

Customers should be particularly concerned that AT&T is not seeking a Mandl successor from within the firm, said Sheila McGee-Smith, a senior analyst at The Pelorus Group, a consulting firm in Raritan, N.J. This "sends the message that you don't have a deep enough bench" or in-house talent, she said.

But generally, stockholders and competitors care more about movement of key executives than customers do, others said.

Early scuttlebutt is that AT&T could raid Pacific Telesis Group, Pacific Bell, MCI or Hewlett-Packard Co. for a successor.

Mandl's departure follows that of other key AT&T executives over the past couple of years: AT&T Wireless Services, Inc.'s Chief Executive Officer Jim Barksdale left in January 1995 to become president of Netscape Communications Corp.

In the same month, Jerre Stead, chairman of what was then AT&T Global Information Solutions, resigned to become chief executive officer of Legent Corp. And AT&T Senior Vice President Richard Bodman retired in April. ■

Maybe he'll come back someday

Mandl is joining a company in a business that AT&T itself is extremely interested in: the wireless local loop.

AT&T is currently going through the onerous process of striking interconnection agreements with Baby Bells as an avenue for delivering local services. But the company has stated that wireless bypass will be a key part of its local service strategy.

"Who knows? Maybe Mandl will return to AT&T someday — should AT&T decide to buy a wireless local-loop company," said Jeffrey Kagan, president of Kagan Telecom Associates, a consulting firm in Atlanta.

Associated Communications is running dedicated services over radio networks in the 18- and 19-GHz bands on a limited basis in 31 cities. It said it will begin testing broadband, point-to-multipoint technology in the second half of this year and will offer commercial services based on it by mid-1997.

The company intends to offer switched and dedicated services, including Internet access, ISDN, frame relay, ATM and videoconferencing over the infrastructure.

—Joanie Wexler and David Rohde

IBM unveils Java initiative for business applications

By Kristi Essick

San Jose, Calif.

IBM last week announced at Object World here that it will team with more than 50 software providers to develop a series of object-oriented application frameworks — written in Java — that can be used to build large-scale business applications.

The initiative, called the San Francisco Project, has been in the works for two years.

It will focus on enabling developers to create vertical market business applications for services such as accounts payable, inventory control, general ledger, distribution and financials.

IBM did not announce when the frameworks or products will be available.

"The concept of using an object-oriented framework to build applications is nothing new," said Ken Sobel, senior analyst for Newton, Mass.-based Hurwitz Group. Companies such as NeXT Software, Inc., which markets the OpenStep set of business objects, are distributing frameworks in their business application development environments, he said.

"What makes the San Francisco frameworks different is that the companies are focusing on creating products for vertical markets," he added.

Separately, IBM and Sun Microsystems, Inc. said they will codevelop technology to link applications to the Internet and intranets through joint licensing of products and the adoption of industry standards.

Under the terms of the agreement, IBM will license Sun's Java client connectivity product, called Joe, which enables users to gain access to existing corporate applications and databases through a Web browser. Sun will license IBM's MQSeries class libraries, which manage the communications between applications running in different computing environments on a network.

Essentially a sophisticated Java applet, Joe is automatically available to users implementing a Java-enabled browser when they choose to download it on an as-needed basis.

"Joe has a lot of potential," said Frank Fabbrocino, a program analyst at UCLA's Data Mining Lab, which has been implementing a beta version of Joe to build multidimensional satellite images since March.

Essick is an IDG News Service correspondent in San Francisco.

SunSoft supplies tool for building Java apps

By Ellen Messmer

Mountain View, Calif.

After an exhaustive yearlong beta period, Sun Microsystems, Inc.'s SunSoft division this week will begin shipping its primary applications development tool kit for building Java applets and applications.

The company tested the product for such a long time in order to increase its speed, which is 30 times faster than when testing began.

SunSoft expects its Java Workshop, which has the look and feel of a Web browser, to be popular with companies that are simply adding Java applets to HTML content, as well as with professional programmers versed in the art of building full-fledged applications.

"It's a complete Java development environment," said Larry Weber, vice president and general manager for SunSoft's workshop products group.

Java Workshop will let programmers develop applications together — even if they are in different locations — by letting them specify Java files as URLs that can be shared across the 'Net, Weber said.

Sun's JavaSoft unit already offers the Java Developers Toolkit of APIs and Class Libraries. SunSoft said Java Workshop falls into the same tool category as Microsoft Corp.'s VBScript and Netscape Communications Corp.'s JavaScript. One edge that Java Workshop has is that it is written entirely in Java, while others only emulate Java interfaces, Weber said.

Customers are happy with the final product, though some wish it would run on more platforms.

"It's definitely speeded up," said Steve Rogers, vice president of online services at American Recordings, Inc., which is promoting artists on the Web using applets written with the Solaris-based version of Java Workshop.

One drawback for Rogers is that Java Workshop is not available for the Macintosh. As a result, the Burbank, Calif., company also uses the Macintosh-based WebBurst from Power Productions Software, Inc.

Currently, Java Workshop is only available for Solaris, Windows NT and Windows.

©SunSoft: (415) 960-9230.

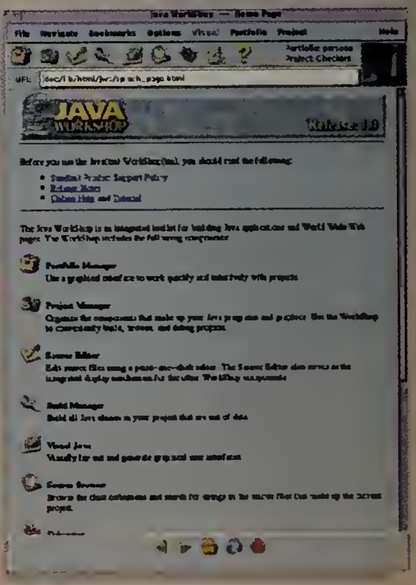
SUNSOFT'S JAVA WORKSHOP

What it is:
Development tool for building Java applications and applets

Platforms:
Windows 95, Windows NT and Solaris

Availability:
Can be downloaded now off SunSoft's Web site (http://www.sun.com) for a 30-day free trial or to purchase; in retail stores starting Sept. 12th

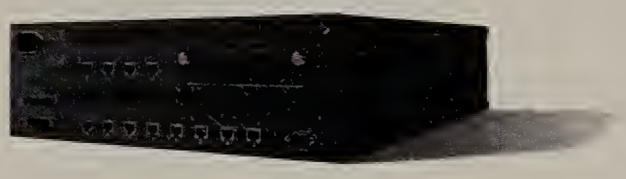
Cost:
$99 until Sept. 31; $295 after that; price includes one-year subscription for all upgrades



Bandwidth is tight. ATM sounds nice. But it also sounds pretty darn expensive.

Switch IBM presents the first affordable 25Mbps ATM Workgroup Solution. Everyone is talking about ATM as the answer for speeding up busy networks. But there are two good reasons why business hasn't stampeded en masse to the ATM solution: It costs a lot. And to get there, you have to rip out everything you have.

Well, with all respect to the status quo, IBM now unveils the new 25Mbps ATM Workgroup Solution. It comes complete with workstation adapters, giving you an immediate boost in bandwidth, with plenty of room to grow in the future. And it all comes at the refreshingly low price of $495 per connection.

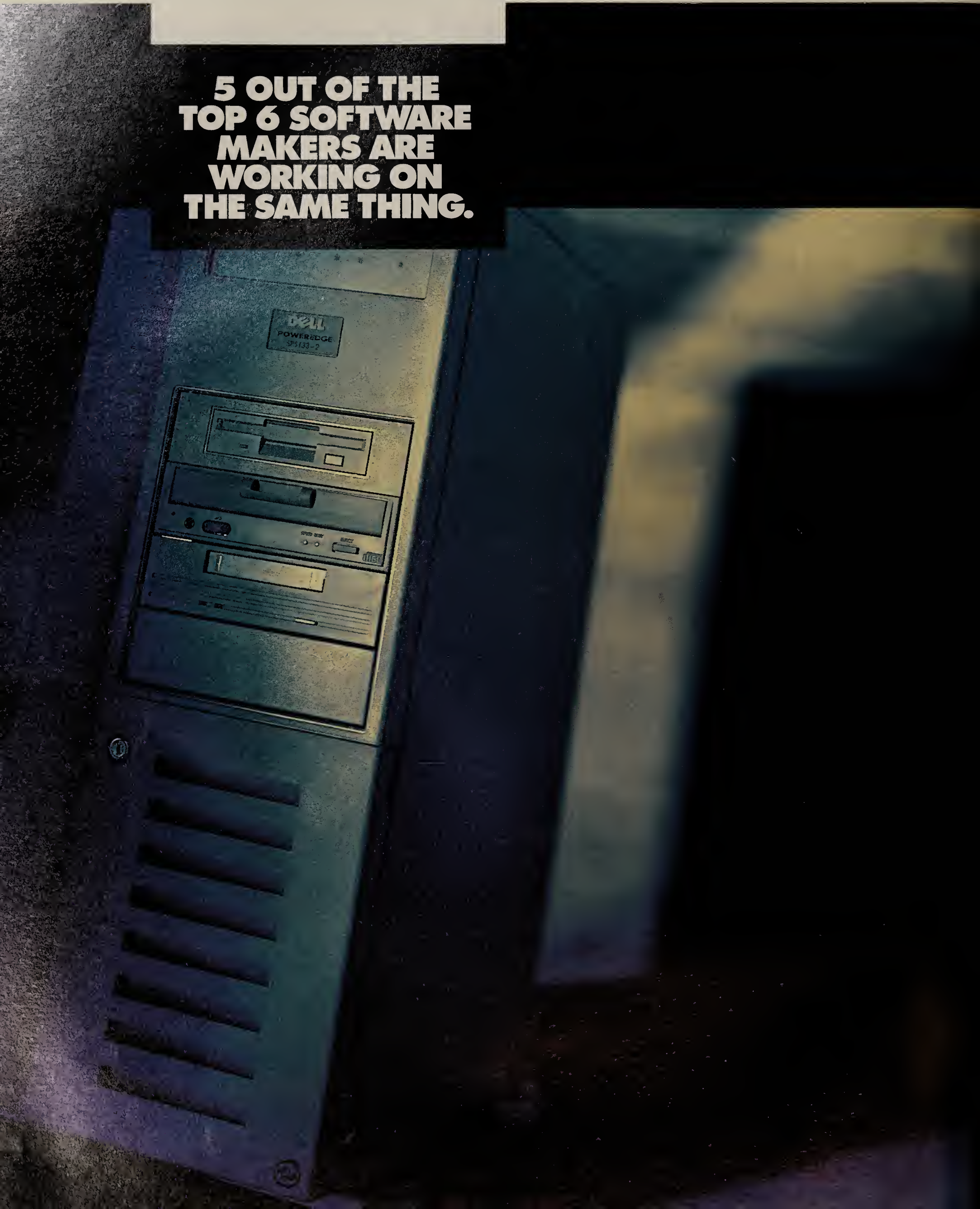


So why just dream about getting an affordable ATM solution when you can install one today? See your nearest IBM reseller or call us at 1 800 IBM-2468, ext. DA130, to learn more. Or, if you prefer, you can visit our Web site at www.raleigh.ibm.com/netad.html for all of the details. We have lots of information to share. And the good news is, we can get it to you fast.

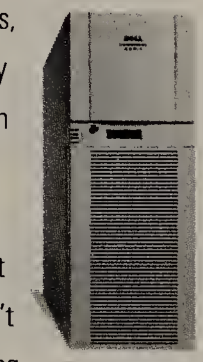
IBM®

Solutions for a small planet™

In Canada, call 1 800 IBM-CALL, ext. 8025. The IBM home page is located at www.ibm.com. IBM is a registered trademark and Solutions for a small planet is a trademark of International Business Machines Corporation. © 1996 IBM Corp. All rights reserved.


5 OUT OF THE
TOP 6 SOFTWARE
MAKERS ARE
WORKING ON
THE SAME THING.
DELL
POWEREDGE
SP5133-2

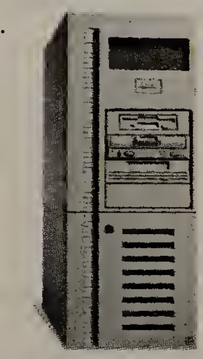
The secret is out in the software industry. Dell servers are used by the industry's heaviest hitters. And if Dell isn't the first word you think of when you think of servers, you're about to find out why it represents the last word in reliability and value.



PowerEdge XL

You see, to handle all the server needs of the biggest software makers, we haven't just developed a deep, abiding respect for mission-criticality, we've also developed a hefty network of dedicated high-end server support. Support that begins with sending along a Systems Engineer with the delivery of every PowerEdge XL server, to make sure it'll be up and running. And that continues with our available Dell CriticalCare, four-hour response, 7 x 24 same day on-site service.

Of course, the thing that makes support like this all the more reassuring is the fact that our ISO 9002 dedicated server factory builds Dell servers to be extremely reliable in the first place. And we're focused on building servers that meet industry standards, instead of the proprietary architecture that IBM, HP and Compaq use.



PowerEdge SP

So if you're driven, risk-averse and obsessive about your data, you have a lot in common with the software industry's biggest success stories. And if you call Dell, you'll have even more.

DELL® POWEREDGE® XL 5166-2
TWO 166MHz PENTIUM® PROCESSORS
(Expandable to Quad Processor)

- 256MB ECC RAM
- Three 4GB Fast/Wide SCSI-2 Hard Drives
- 512KB Write Back Cache
- 15TX Monitor (13.7" v.i.s., .26NI)
- Mylex RAID Controller
- Intel® Pro 10/100 PCI NIC
- 6X SCSI CD-ROM
- 4/8GB DAT Tape Back-up
- SafeSite™ Server Management System
- On-site‡ Setup and Validation
- 4 Hour BusinessCare℠ Warranty†(5 x 10)
- 1 Year DirectLine℠ NOS Support

$25,394

Product Code: #200132

DELL POWEREDGE XL 5133-2
TWO 133MHz PENTIUM PROCESSORS
(Expandable to Quad Processor)

- 256MB ECC RAM
- Three 4GB Fast/Wide SCSI-2 Hard Drives
- 512KB Write Back Cache
- 15TX Monitor (13.7" v.i.s., .26NI)
- Mylex RAID Controller
- Intel Pro 100 PCI Ethernet Adapter
- 6X SCSI CD-ROM
- SafeSite Server Management System
- On-site Setup and Validation
- 3 Year BusinessCare Warranty†
- 1 Year DirectLine NOS Support

$19,697

Product Code: #200135

DELL POWEREDGE XL 5133
133MHz PENTIUM PROCESSOR
(Expandable to Quad Processor)

- 128MB ECC RAM
- Three 4GB Fast/Wide SCSI-2 Hard Drives
- 512KB Write Back Cache
- 15TX Monitor (13.7" v.i.s., .26NI)
- Mylex RAID Controller
- 3Com® PCI 10/100 Ethernet Adapter
- 6X SCSI CD-ROM
- SafeSite Server Management System
- On-site Setup and Validation
- 3 Year BusinessCare Warranty
- 1 Year DirectLine NOS Support

$15,008

Product Code: #200124

DELL POWEREDGE SP 5166
166MHz PENTIUM PROCESSOR
(Expandable to Dual Processor)

- 64MB ECC RAM
- Three 2GB SCSI Hard Drives
- 512KB Write Back Cache
- 15LS Monitor (13.7" v.i.s., .28NI)
- Dell SCSI Array RAID Controller
- 3Com PCI 10/100 Ethernet Adapter
- 6X SCSI CD-ROM
- SafeSite Server Management System
- 3 Year BusinessCare Warranty
- 1 Year DirectLine NOS Support

$11,566

Product Code: #200133

At no extra charge, get Microsoft® Windows NT® Server in the package or pre-installed on your hard drive with each server you buy. Offer ends 9/30/96.

intel inside pentium PROCESSOR

MICROSOFT. WINDOWS NT. READY-TO-RUN

3Com Network Ready™

DELL®

800-822-3782

http://www.dell.com

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm
In Canada,* call 800-839-0148

Keycode #29023

†For a complete copy of our limited warranties, please write Dell USA L.P., 2214 W. Braker Lane, Suite D, Austin, TX 78758. ‡This on-site parts and labor service provided by Digital Equipment Corporation and is available in 29 metropolitan areas. For more information call Dell's TechFax℠ line at 1-800-950-1329. Prices and specifications valid in the U.S. only and subject to change without notice. Microsoft, Windows, Windows NT and the Windows NT logo are registered trademarks of Microsoft Corporation. Intel, the Intel Inside logo and Pentium are registered trademarks of Intel Corporation. 3Com is a registered trademark and the 3Com Network Ready logo is a trademark of 3Com Corporation. BusinessCare and DirectLine are service marks of Dell Computer Corporation. ©1996 Dell Computer Corporation. All rights reserved.

SAP to transform applications into distributed components

Company to use Microsoft's COM and DCOM technologies.

By John Cox
Philadelphia

SAP America, Inc. this week will unveil a plan to recast its R/3 client/server business applications as a set of distributed components.

Benefits to customers will be lower cost of ownership, faster application development, quicker adaption to changing business requirements and easier interoperability with third-party applications, said Paul Wahl, the company's chief executive officer.

SAP will lay out the new plan for customers attending the company's annual North American users' conference, called SAPphire.

The SAP distributed components will work together via standard interfaces, Wahl said. Low-level APIs and remote procedure calls initially will link the components, and a new specification will create a set of shared semantics between the components, letting them, in effect, understand each other.

To link components, SAP will rely initially on its Application Link Enabling technology and Microsoft Corp.'s Component Object Model (COM), Wahl said.

SAP will eventually implement Microsoft's Distributed COM,and possibly the Object Management Group's Common Object Request Broker Architecture. The first part of the plan will roll out in December: SAP will introduce Internet/Web support, an object repository and the first group of published APIs.

According to SAP, 200 third-party vendors have been certified as incorporating the APIs in their products. In 1997, SAP will release R/3 4.0, which will include the first set of distributed components.

©SAP: (800) 777-9727.

IP voice vendor looking for carriers

Vienna Systems' server can also be used in the corporate setting to run voice over IP.

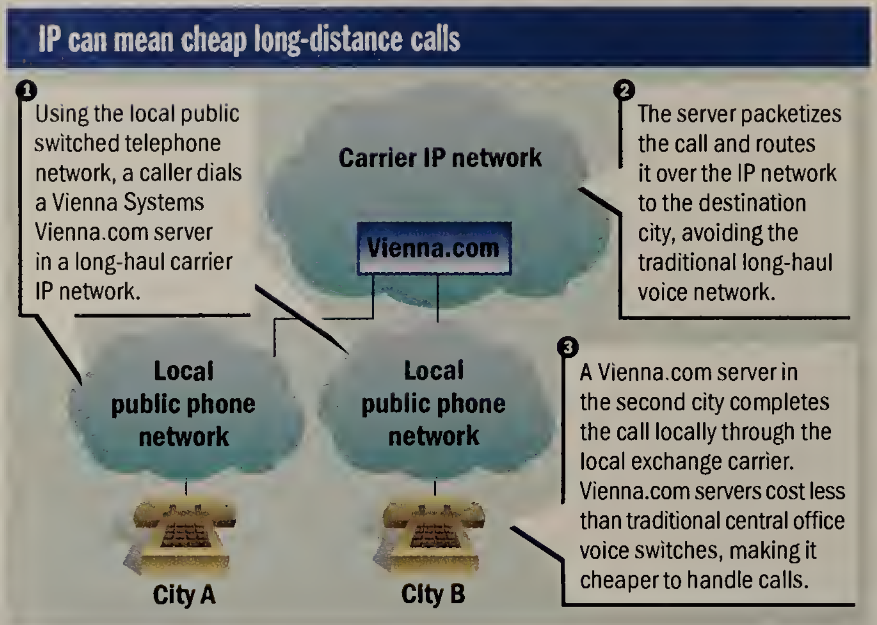
By Tim Greene
Kanata, Ontario

Start-up Vienna Systems Corp. hopes to take voice over the Internet to new levels this week with a system that not only lets voice calls ride over corporate IP networks, but is designed to support a new class of carrier service.

The pitch to enterprising long-distance carriers is simple. IP voice would be a less-expensive way for them to provision long-distance service because they can avoid installing costly central office switches.

The Vienna.com product, which will make its debut next month at NetWorld+Interop 96 in Atlanta, is among a wave of more robust products growing out of Internet phone technology (*NW*, Aug. 19, page 1).

IP can mean cheap long-distance calls



① Using the local public switched telephone network, a caller dials a Vienna Systems Vienna.com server in a long-haul carrier IP network.

② The server packetizes the call and routes it over the IP network to the destination city, avoiding the traditional long-haul voice network.

③ A Vienna.com server in the second city completes the call locally through the local exchange carrier. Vienna.com servers cost less than traditional central office voice switches, making it cheaper to handle calls.

In a corporate setting, users can run voice over the private IP network with the help of a Vienna.com server and Windows 95 PCs equipped with a sound card and microphone or phone handset. And with an ISDN connection to the public switched telephone network (PSTN), users can also dial to phones off the private IP network.

But the same server installed in a carrier network can also act as a gateway between a traditional voice central office switch and an IP backbone, allowing carriers to offer an IP-voice class of service.

The server keeps track of call states such as ring, connected, call drop and other information that matches information carriers collect in voice switches to do billing. A toll-bypass carrier, for example, could receive local calls over the PSTN on a Vienna.com server and bridge it to an alternative carrier's long-distance IP network. The user would first dial the server, a PIN number and then the final destination number.

A carrier could offer the service at a lower price because the Vienna.com server would cost less than a central office voice switch, according to Larry Reback, director of technology services for American Communications Systems, Inc. (ACSI), a competitive access provider in Annapolis Junction, Md.

Reback is considering Vienna.com to carry voice over

See **Vienna**, *page 69*

Cisco

Continued from page 1

plicated if you don't have the right tools to administer it," said Brian Hengen, database administrator with the Electronics Industry Association in Washington, D.C.

"A product that can manage IP properly across the network so you don't have to worry about assigning the addresses is something that this company would be very interested in looking at," he said.

Cisco appears to be entering the domain of Quadritek Systems, Inc., Isotro Network Management, Inc. and other companies that have built a business on IP name and address management.

DNS/DHCP Manager could be a significant product for Cisco and its customers. It could serve as a value-added feature of Cisco routers and dial-access concentrators, helping Cisco sell more high-ticket hardware to large companies and Internet service providers.

Corporations are currently implementing worldwide IP address management systems to handle up to hundreds of thousands of addresses. Quadritek's client list, for example, includes Air Products & Chemicals, Inc. (20,000 addresses), Bristol-Meyers Squibb Co. (40,000 addresses), Dow Jones Telerate, Inc. (15,000 addresses), Georgia-Pacific Corp. (30,000 addresses) and United Parcel Service of America, Inc. (200,000 addresses). "We're taking [Cisco's] announcement very seriously," said Joe D'Andrea, president of Quadritek.

Sources say DNS/DHCP Manager is a DHCP server configuration tool with dynamic DNS update capabilities. It includes a graphical user interface (GUI) that runs on Windows NT, Solaris and other Unix systems, DHCP and DNS servers, and a proprietary file system for maintaining address information, sources said.

From the GUI, users can configure the DHCP address server and synchronize it with a DNS name server via a Cisco-developed, message-based protocol. The Cisco DNS server can update other DNS servers via standard "zone transfers," sources said.

DNS/DHCP Manager is intended to manage DNS and DHCP functions from a single point rather than managing DHCP and DNS servers independently. "You've got a dynamic coupling between DNS and DHCP," one source said.

Products from Quadritek and Isotro do that, as well. But Cisco's DNS/DHCP Manager may not handle subnetting as elegantly as these other tools, and it may lack the automation capabilities of Quadritek's QIP and Isotro's NetID products, sources said.

Sources believe DNS/DHCP Manager will be priced about $1,500 per server. It is expected to ship in October.

Cisco did not comment by press time. ■

Cisco unveils stackable branch office switch

While Cisco Systems, Inc. is just making its foray into the IP address management business, the company also last week sought to solidify its ground in the remote access market.

Cisco unveiled a stackable switch for branch offices that features routing capabilities for accessing corporate nets and the Internet.

The Catalyst 3200 is a chassis-based switch that features the same 480M bit/sec backplane as Cisco's Catalyst 3000 stackable Ethernet switch. It sports seven slots — six for three- and four-port Ethernet, two-port Fast Ethernet and 100VG-AnyLAN, and single-port ATM switching cards. The seventh slot houses a routing module or an additional LAN switching or ATM card.

The routing module is similar to Cisco's 2503 remote access router. It features two T-1-capable serial ports, a single ISDN Basic Rate Interface and an integrated 10M bit/sec data connection. It also routes IP and IPX protocols, and forwards 6,000 packet/sec.

The 3200 also features a StackPort, which lets users stack and interconnect up to eight 3000 and 3200 switches through a switch matrix. This provides users with up to 224 switched Ethernet or 112 Fast Ethernet ports, and 3.8G bit/sec of network bandwidth, according to Cisco.

Modules for the Catalyst 3000 can also be used in the 3200 chassis, the company said.

The 3200 handles 10,000 media access control addresses and includes embedded Remote Monitoring capabilities for gathering statistics, events, historical data and alarms.

The Catalyst 3200 will be available in October, and the WAN router module will be available in November. Pricing starts at $4,995.

Cisco: (408) 526-4000.

—Jim Duffy

Cisco's Catalyst 3200

- Stackable chassis-based switch with 480M bit/sec backplane
- Seven slots for Ethernet, Fast Ethernet, 100VG-AnyLAN, ATM and WAN router modules
- Support for 10,000 MAC addresses
- Available in October; prices start at $4,995

Infinite

Continued from page 6

client to retrieve mail from the road, and the ability to get mail from a LAN-based system via the 'Net is spotty.

"Eventually, you should be able to do this with a Web browser [from most mail clients]," said Rob Enderle, an analyst at Giga Information Group in Santa Clara, Calif. In the meantime, "there is a market for [InterChange]," he said.

Hewlett-Packard Co. already supports browser access into its OpenMail system, and Microsoft has announced similar plans for Exchange. But with browsers, users give up advanced mail features.

"With the amount of mail we're sending, we need a strong mail client. I don't think a browser would meet out needs," said Brent Jenkins, an ExpressIT 2000 beta tester and vice president of IS at Coit Services, Inc., a division of Coit Drapery and Carpet Cleaners, Inc. in Burlingame, Calif.

Infinite will also announce Connect2Exchange, software that lets Windows 95 and Windows NT users exploit the built-in messaging capabilities in those operating systems and to link to other mail networks.

The company is billing Connect2Exchange as a less expensive alternative to Microsoft's Exchange because it can link Windows In-Box users to the Internet, fax, pagers, printers and mail systems such as Lotus Development Corp.'s cc:Mail. The software requires Infinite's Connect2 message handling system.

ExpressIT 2000 and Connect2-Exchange will ship next month and are priced at $49 per user and $349 for 10 users, respectively. Infinite InterChange will ship in the fourth quarter and costs $399 for 10 users. ■

PROFILE: INFINITE TECHNOLOGIES

Headquarters: Owings Mills, Md.

Core products: Connect^2, a message router for MHS, Unix, SMTP and TCP/IP networks; WebMail remote Internet mail client

Key competitors: Lotus, Microsoft, Novell and Coordinate.com in the E-mail market; Ten Four and Worldtalk in the message transport area

Financials: Privately held

No. of employees: 40

Data General bolsters its Pentium Pro servers

By Christine Burns

Westborough, Mass.

Data General Corp. last week announced an aggressively priced addition to its line of Pentium Pro Aviion servers slated for the departmental or workgroup server market.

The AV 3600 accommodates as many as four 200-MHz processors, has 512K bytes of cache per processor and supports as much as 4G bytes of memory.

The 3600 joins the AV 4900 office server and AV 5900 rack-mounted enterprise server, announced in July in Data General's line of Pentium Pro offerings. The company is also expected to ship a low-end server with only one or two Pentium Pro processors and a smaller chassis in October.

The AV 3600 includes scalability and management features previously reserved for enterprise servers. For example, the AV 3600 has an expandable dual-channel PCI bus that supports 15 I/O slots: seven PCI slots, seven EISA slots and one shared PCI/EISA slot.

The server will also ship with Data General's AV/Alert automatic detection software, which supports system diagnostics, machine-initiated call-out to Data General service centers and remote assistance.

Stewart Gibbs, a research director at D.H. Brown and Associates in Port Chester, N.Y., said it is the bundling of these enterprise features that will give Data General a leg up on the 200-MHz Pentium Pro workgroup servers planned by competitors.

The AV 3600 will ship next month, starting at $12,000.

©Data General: (508) 898-5000.

When you have a network problem, does your vendor leave you hanging?

Try connecting with us.

Every network company promises to support their products.

But when issues come up in the real world, will they really be there?

At SMC, the answer is yes. Because we've built the industry's top-rated technical support team. A team that will help you solve all the challenges you face, from basic SMC product installation and configuration, to advanced network troubleshooting. A team that offers round-the-clock support to key resellers, to help you keep your network running 24 hours a day.

But even with the industry's best support, we prefer to solve your problems—before you have them. Which is why we offer products like the EZSwitch Plus™ and TigerSwitch™ XFE, the easiest Ethernet and Fast Ethernet workgroup switching solutions in the business.

So if your network vendor has left you dangling, it's time to get back on your feet. And connect with SMC.

SMC EZ Switch Plus
Six 10 Mbps/Two 100 Mbps ports

SMC TigerSwitch XFE
Sixteen 10 Mbps/One 100 Mbps ports

SMC®

Connect With Us.

For information on SMC products, call 1-800-SMC-4-YOU, Dept. HM06
http://www.smc.com

©Copyright 1996 Standard Microsystems Corporation

Circle Reader Service #59

SOME WORDS OF ADVICE ABOUT DSUs FOR YOUR INTERNET ACCESS...

Call us toll-free at 888-I'NET-DSU
or visit us at http://www.visualnetworks.com

Circle Reader Service #52

WANs & Internetworking

Covering: Network Architectures and Management • Routers • Muxes, Remote Access Gear, Modems, PBXs and other CPE • Mobile Computing Products

Briefs

■ **Tandem Computers, Inc.** *last week announced a fault-tolerant CORBA 2.0-compliant* **object request broker** *with transaction services. NonStop Distributed Object Manager combines the firm's transaction-processing software with IBM's SOMobjects 3.0 object technology and is intended to ease transaction processing application development in the financial, retail and telecommunications marketplaces.*

The product will be available by early 1997.

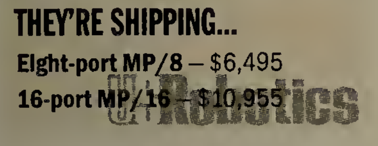
Tandem: (408) 285-6000.

■ **U.S. Robotics** *last week announced it is shipping MP/8 and MP/16 I-Modems. Designed for network central sites, the two devices support both analog and* **ISDN calls** *from each port on a call-by-call basis.*

THEY'RE SHIPPING...

Eight-port MP/8 – $6,495

16-port MP/16 – $10,955



U.S. Robotics: (708) 982-5001.

■ **Acclaim Communications, Inc.** *last week introduced a device it claims will support* **switching and routing.** *The company announced the EtherWAN 1024-2ES, which supports 24 10M bit/sec switched Ethernet ports, two 100M bit/sec switched Ethernet ports and an optional WAN interface. A second model, the 2024-FES, offers 24 10/100M bit/sec switched Ethernet ports, together with an optional add-on Gigabit Ethernet module. Pricing for the 1024-2ES and 2024-FES starts at $4,995 and $14,400, respectively.*

Acclaim: (408) 327-0100.

■ **NetSoft** *last week rolled out a set of tools to help ease the* **management of remote PCs** *in a large IBM mainframe or mid-range environment. NS/Portfolio Manager runs on Windows 95 or Windows NT servers and allows remote software distribution, configuration management and troubleshooting of SNA clients. The $1,495 NS/Portfolio Manager will be available by October.*

NetSoft: (888) 638-7638.

OnStream supports T-1 ATM inverse muxing

New features also offer frame relay-to-ATM interworking.

By Tim Greene
Santa Clara, Calif.

OnStream Networks, Inc. will introduce at NetWorld+Interop 96 next month hardware that could make T-1 ATM services inexpensive enough to attract users who never would have considered it otherwise.

The T-1 ATM inverse multiplexing module for OnStream's CS600 ATM access device is priced 30% to 40% less per port than competing devices. This should give service providers the chance to offer service for less money and pass the savings along to customers.

INTEROP'96 NETWORLD+ 10th ANNIVERSARY

In addition, the eight-port inverse multiplexing module would allow users to bond together the bandwidth of as many as eight T-1s to meet wide-area needs over 1.5M bit/sec, but less than a full 45M bit/sec T-3 pipe. With most service providers, it becomes cheaper to buy a full T-3 after four T-1s.

With a T-1 ATM service available for $450 to $550 per month, the potential market for ATM wide-area users would blossom, according to Thomas Nolle, president of CIMI Corp., a technology assessment firm in Voorhees, N.J.

"That would be a good price. If it was distance-insensitive, that would be wonderful," said Sanjay Chadha, manager of technology evaluation and planning for Lyondell Petrochemical Co. in Houston. His company uses broadband frame relay links but has considered ATM.

Bonding T-1 ATM lines could also help streamline a network, Chada said. "It would allow us to tailor the WAN more to the needs," he added.

Nolle said he thought carriers could provision a T-1 service in that price range using the new modules. Typical monthly T-1 ATM rates are $650 to $850, he said.

One drawback is that a service provider would have limited choice of customer premises equipment to choose from if it used the CS600 for an imuxed service. The user would have to use a DSU/CSU, a router with an ATM port or another CS600 at the customer premises for the service to work.

Nolle said some smaller vendors are working on inexpensive T-1 Inverse Multiplexing ATM (IMA) CPE boxes that are scheduled for release this fall. That would coincide with the October availability of the inverse multiplexing module for the CS600.

Nolle said the new premises boxes would have to fall in the $4,600 to $6,000 price range in order to be viable.

OnStream also said it was working to make the CS600 interoperable with Cisco Systems, Inc.'s IMA products (*NW*, July 22, page 17). OnStream plans to announce other collaborating vendors within 60 days.

OnStream will also introduce two frame relay modules for the CS600 — one with four ports and one with a single port.

The four port module is designed primarily for service providers to integrate 64K to 8M bit/sec frame relay lines onto a private or public ATM network.

The single port module can support frame relay-to-ATM conversion at speeds up to 50M bit/sec.

Both modules perform full interworking between standard RFC 1483 frame relay frames and standard RFC 1490 ATM cells. They also map frame relay congestion information to ATM congestion information.

The CS600 platform, introduced last year, also features a 1.6G bit/sec backplane and can be fitted with Ethernet T-3, and structured and unstructured T-1 cards.

©OnStream: (408) 727-4545.

New from OnStream

OnStream Networks has added three options for its CS600 ATM access multiplexer platform.

Module	**T-1 Inverse multiplexing**	**Four-port frame relay module**	**One-port, 50M bit/sec module**
Function	Logically bonds up to eight T-1 ATM lines	Integrates multiple frame relay sites for an ATM backbone	Translates aggregated frame relay traffic to ATM
Cost	$15,200	$8,000	$6,000

Start-up unveils multimedia branch office router

By Jim Duffy
San Jose, Calif.

Start-up Pivotal Networking, Inc. last week unveiled a multiprotocol router designed to deliver secure multimedia transmissions over multiple network services.

The Pivotal 1600 sports one LAN and two WAN links. One of the WAN links can either be an ISDN Basic Rate Interface or a T-1 serial port. The other can serve as a T-1 frame relay/leased-line connection or an analog modem port.

The ISDN BRI supports both the U interface for connecting routers to a network in North America and the S/T interface for Europe and Asia. The four-wire S/T support allows digital devices, such as a digital telephone or video coder/decoder, to share the ISDN line.

The Pivotal 1600 was designed for Internet, intranet and branch office applications. It is intended for users who only need leased-line/frame relay connections, or those who use frame relay as the primary connection and ISDN/modem for backup purposes. It may also appeal to those who currently use ISDN but plan to gradually upgrade to higher speed services provided by leased-line or frame relay connections, Pivotal said.

The router's IP multicasting capability allows it to send a single video signal to multiple clients, which saves bandwidth and reduces network traffic, Pivotal said.

In addition, its support of the Resource Reservation Protocol allows the router to request quality of service guarantees for real-time, "jitter-free" full-motion audio and video transmissions, the company said.

The Pivotal 1600 also supports the Data Encryption Standard to ensure the privacy of data sent out over the WAN. This feature allows users to filter and capture intrusive data, and decode it to identify its origin.

The router's Multilink PPP feature supports bandwidth-on-demand applications including backup, overflow and load sharing over ISDN, frame relay, leased lines and analog modem connections. The Pivotal 1600 can also spoof IP and IPX protocols to maintain switched connections and alleviate unwanted bandwidth utilization.

Users can also take advantage of an integral DSU/CSU option, which simplifies installation and configuration, and reduces equipment costs for digital network connections. And Pivotal plans to add support for frame relay switched virtual circuits to the 1600 so users do not have to nail up dedicated frame relay links.

Additionally, the Pivotal 1600 features telnet and SNMP management, flash memory upgrades and an optional, integrated eight-port 10Base-T switching hub.

The list price for the 1600 starts at $1,295. It will ship in October.

©Pivotal: (408) 777-0336.

A Pivotal product

Features of the Pivotal 1600

- Designed for Internet, intranet and branch office applications
- Supports IP multicasting
- Supports RSVP
- Features DES encryption
- Includes Multilink PPP
- Spoofs IP and IPX
- Costs $1,295

Rockwell, Teloquent raise Internet call center stakes

By David Rohde

Phoenix

Customers may not be trying to reach your company's 800 call center over the Internet yet, but your call-routing vendor wants to be sure that you are ready when they do.

Users attending this week's Incoming Call Center Management show will be greeted by a new round of Internet strategy announcements from automatic call distributor (ACD) hardware makers and their software-based rivals.

Rockwell International Corp.'s Switching Systems Division is announcing a partnership with NetSpeak Corp. to enable users of NetSpeak's WebPhone software to reach a call center agent sitting behind a Rockwell Spectrum ACD.

And Teloquent Communications Corp. will unveil a way for a company's customers to reach agents via the World-Wide Web, as well as a way for data about ordinary 800 callers to reach distributed agents in real time via corporate intranets. Teloquent offers ACD-less call routing via telephony servers connected to ISDN lines.

Under its new Rockwell partnership, NetSpeak will provide both server software and desktop applications to the vendor. "This leapfrogs the current offerings which [either] require two phone lines or force customers to disconnect from the Web to receive a callback," said Jake Chacko, Rockwell's executive director of market planning.

Teloquent's new intranet offering, Open@gent (pronounced simply Open Agent) will be on the way shortly. Scheduled to ship next month, the Open@agent client software, in conjunction with a Web browser, allows a remote call center agent to receive caller data on screen over a corporate intranet while the Teloquent PhoneServer synchronizes the arrival of an 800 or other phone call over a plain old telephone service line. In such a fashion, a remote agent does not need an ISDN line — a previous requirement for all Teloquent installations — though the corporate site where the PhoneServer is located still does.

In November, Teloquent plans to deliver its Web Call Center offering. The software works with a Web server connected to a Teloquent PhoneServer. It will enable the two, working in tandem, to detect whether a "call me" request has been initiated by a consumer using IP telephony software.

If it has, the Web server can direct the consumer's browser to launch the call over the Internet while the PhoneServer chooses an available agent to receive the call, explained Jeff Fried, director of product management. ■

BusinessBriefs

Lightbridge, Inc. and **Trans Union Corp.** have teamed to fight wireless fraud. Lightbridge has integrated Trans Union's Fraud Detect information verification system into Fraud Sentinel, Lightbridge's subscription fraud management software for carrier systems. The software will alert carriers of erroneous or potentially fraudulent information during the customer application process.

Lightbridge: (617) 890-2000.

Apertus Technologies, Inc. last week announced **Bull Worldwide Information Systems** will resell its Apertus Express 3.0 family of SNA communications software products. Under the agreement, Bull will sell the Express 3.0 software loaded on its Reduced Instruction Set Computing-based Escala and Estrella platforms.

Apertus: (800) 793-3509.

ADC Kentrox's ISDN/frame relay access router, Pacesetter, has been certified for use in **US WEST, Inc.'s Interprise** group's customer networks. The router supports analog modems, ISDN, 56K bit/sec digital data service, T-1 frame relay or leased lines. The router also supports IP/IPX routing, bridging and SNMP.

ADC Kentrox: (503) 643-1681.

Verilink's WAN access cards offer you easy, money-saving access to the winning suit of broadband services. We play it straight—so you can bank your savings.

Verilink's AS2000 Integrated Access Cards stack the deck in your favor

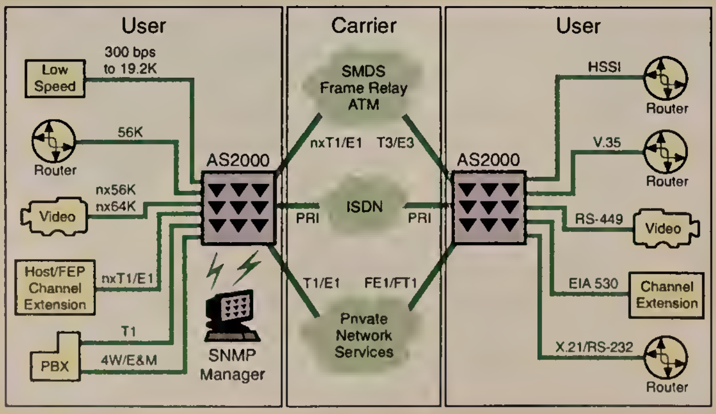
Even when your network costs change, you'll still be holding the winning access cards.

No matter which service provides the bandwidth you need, tariff changes can quickly—and dramatically—affect your bottom line.

For Dave, reductions in leased-line costs, changes in calling rates, discount offers, and the availability of new services aren't wild cards—they're opportunities. Because AS2000's flexibility lets him squeeze the most out of his network. In spades.

The DS0/E0 micro-DCS capability lets Dave build circuits between any two data ports. Channel grooming guarantees that not one bit of bandwidth is wasted. Automatic bandwidth allocation gives him the edge in resource management.

So, do like Dave. Deal yourself a winning hand every time with AS2000's universal platform. The most flexible way to build your network, keep your investments risk-free, and beat tomorrow's challenges hands down. All backed by a 5-year warranty.



For openers, call 1.800.VERILINK. Or look for us on the World Wide Web: http://www.verilink.com.

VERILINK

ISO 9001

Verilink Corporation • 145 Baytech Drive, San Jose, CA 95134 • Telephone number 408.945.1199 • Toll-free number 800.837.4546 • Fax number: 408.262.6260

"Visit us at Networld + Interop in Atlanta, Georgia, September 18-20, at booth #6968."

Circle Reader Service #60

Follow-the-leader must be a great game.

All of our competitors play it.

Xylogics. The world's leading Universal Remote Access Company. Just ask Bay Networks.

Lately everyone is claiming leadership in remote access. Some quote revenue. Others quote units shipped. But the truth about leadership is irrefutable: more people dial into Xylogics equipment than any other vendor. Want proof? Just check the latest market studies from In-Stat, Dell'Oro Group, and IDC.*

Xylogics has outdistanced the competition by serving you better. Our award-winning remote access servers deliver what you demand for the enterprise: scalability, flexible network management, redundancy, security, multiprotocol support and broad WAN connectivity options.

Now we're part of Bay Networks, and our investment in product excellence and customer support is going to outdo anything we've done before. So you can continue to look to us for the best solutions for enterprise remote access. And our competition can just…look up.

Get the facts on remote access from the leader. Call for our "Understanding Universal Remote Access" white paper.

Xylogics

A Bay Networks Company

1-800-89-ANNEX
617-272-8140 • +44 1 908 222 112 • Email: sales@xylogics.com
http://www.xylogics.com

*In-Stat, Worldwide Enterprise Remote Access Market Share, 1994
*Dell'Oro Group, Worldwide Remote Node Server Market Share, First Half 1995
*IDC, Worldwide Combined Hardware and Software-Based Remote Access Server Market Share, First Half 1995

Circle Reader Service #53

If you could drive all your TCP/IP applications through one easy-to-use interface, what would you have?

Time to do your job.

tcpCONNECT4™
Check it out.
www.intercon.com/201/

Network managers everywhere are finding life more manageable thanks to InterCon's new tcpCONNECT4™ Communications Environment. CONNECT4 integrates the configuration and operation of everything from email and Web browsing to file sharing and terminal emulation under one simple, intuitive interface for both Windows and Mac. Training and support are radically reduced. Users become more productive. Call InterCon at 1-800-468-7266, dept. 201 or visit our Web site for a free trial copy. The tcpCONNECT4 Communications Environment from InterCon. Do less work, get more done.

©1996 InterCon Systems Corporation. All rights reserved. tcpCONNECT4 is a trademark of InterCon Systems Corporation.

Circle Reader Service **#47**

Covering: Local and Long-Distance Services • Value-Added Networks • Cable, Satellite and Wireless Networks • Regulatory Affairs • Carrier-Based Internet Services

Briefs

■ **Bell Atlantic Corp., SBC Communications, Inc.** *and* **Pacific Bell** *have chosen ISCP Intelligent Network Solutions from Bell Communications Research as their platform for letting users keep the same phone number when they switch local carriers. Designed to encourage* **local telephone competition,** *number portability until now has been done only on an interim basis using a call-forwarding method that wastes phone numbers. It has been a sticking point between local exchange carriers and potential competitors that want to offer local dial-tone service.*

■ *Worldwide Internet service provider* **Apex Global Information Services (AGIS)** *plans to announce today an* **interconnection** *agreement with Bell Atlantic Internet Solutions that will extend Bell Atlantic Corp.'s 'Net reach globally. AGIS has had a similar arrangement with Pacific Bell Internet Services in place since last fall.*

■ **Sprint Corp.** *last week became the last of the Big Three telephone companies to announce a consumer* **Internet access service.** *Sprint plans to offer Sprint Internet Passport in late fall at the familiar flat-rate monthly price of $19.95. The company said by year-end it will support browsers other than Netscape Communications Corp.'s Navigator, as well as Macintosh computers, integrated billing with long-distance services and 800-number access for mobile travelers.*

Sprint: (800) 359-3900.

■ **Brooks Fiber Properties, Inc.** *has been granted the status of* **competitive local exchange carrier** *for the state in Arizona. The company plans to install a switch in Tucson and offer switched local dial-tone and other services by the end of the year. Brooks is building, or has built, networks in 26 U.S. cities and has plans to be in 50 by the end of 1998.*

Microsoft, GTE put ADSL through paces

Secure corporate access over the Internet is one application, Web mirroring another.

By Tim Greene
Redmond, Wash.

Up until now, trials of Asymmetric Digital Subscriber Lines have focused on the bits and bytes of whether the technology can deliver broadband services over a standard voice telephone line in the real world.

Microsoft Corp. and GTE Corp. are taking this a step farther with a telecommuting trial that combines ADSL with other technology to carve out intranets from the Internet.

Microsoft is using the tests to run a secure Internet protocol through its paces, and is doing it over copper residential telephone lines that support T-1-speed ADSL. With it, Microsoft will give 100 of its employees access to the Microsoft corporate network over an Internet link.

The trial incorporates mirroring of frequently used Web sites on a server within the GTE network, ensuring quick access that lets users fully exploit ADSL's speed.

"This is the first time anyone has really looked at the finer points of how ADSL will be deployed," said Kieran Taylor, a broadband consultant with TeleChoice, Inc., a consultancy in Verona, N.J.

NetworkWorld Fusion

Get the Inside line on ADSL on Network World Fusion (http://www.nwfusion.com). Select News+.

Central to the trial is the Point-to-Point Tunneling Protocol (PPTP) that Microsoft helped develop earlier this year in concert with other vendors (*NW,* March 18, page 17). With PPTP, remote client traffic is encapsulated in secure PPTP frames for transmission over the Internet. PPTP frames can only be decoded by the appropriate corporate access server.

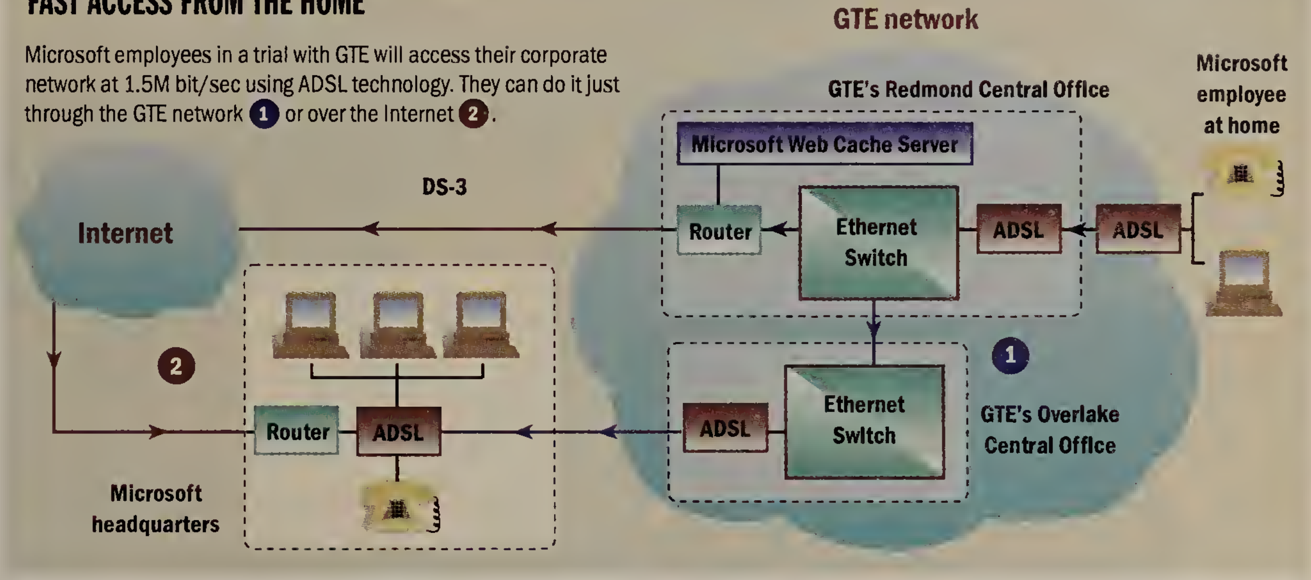
PPTP envelopes PPP packets whole, thereby letting the user employ standard local IP addresses. The protocol is supported by Windows NT 4.0, according to Microsoft, and Windows 95 support will be added sometime in the future.

According to GTE, the trial represents a way to evaluate the real costs of offering an ADSL service rather than simply measuring whether such a service is technically feasible.

GTE plans to decide by year-end whether to offer a commercial ADSL service, and if it does, it will be rolled out next spring. Flynn Nogueira, manager of the ADSL program office for GTE Telephone Operations, said she expects that when GTE does offer ADSL service, it will cost $40 to $70 per month. ■

FAST ACCESS FROM THE HOME

Microsoft employees in a trial with GTE will access their corporate network at 1.5M bit/sec using ADSL technology. They can do it just through the GTE network ① or over the Internet ②.


GTE network
GTE's Redmond Central Office
Microsoft employee at home
Microsoft Web Cache Server
DS-3
Internet
Router
Ethernet Switch
ADSL
ADSL
②
①
Router
ADSL
ADSL
Ethernet Switch
GTE's Overlake Central Office
Microsoft headquarters

Ameritech offers graphical frame relay performance data

Managed WAN customers get Network Health reports.

By David Rohde
Chicago

Ameritech Corp. this week will announce that it is including a leading performance measurement tool as part of its managed frame relay service.

The regional Bell operating company will become the first carrier to offer reports generated by Network Health-Frame Relay, a piece of performance measurement software from Concord Communications, Inc. of Marlborough, Mass.

The move is designed to address users' needs to quantify the many variables in frame relay transport, according to Ameritech and Concord officials. Network Health-Frame Relay graphically represents data such as the percentage of the day that each permanent virtual circuit is utilized and the percentage of frames discarded and resent.

Ameritech will install Network Health at its sites to generate data for its NetResults reporting service. The reports will then be available for users of both Ameritech's managed frame relay and Connectionless Broadband Data Service (CBDS) offerings. CBDS is Ameritech's tag for cell-based switched multimegabit data service.

Reaching out

Ameritech is the first service provider to join Network Health's roster of partners, which includes:

Ameritech	Frame relay performance reports for Ameritech's NetResults service
Bay	Integration of performance reports with remote monitoring capabilities
Cabletron	Integration of performance reports with Spectrum Enterprise Manager
CA	Joint marketing of UniCenter network management
HP	Network Health software runs on HP Unix hardware platforms
Oracle	Developing a management information base for Oracle databases
Sun	Network Health software operates on Sun SPARCstations running Solaris

According to Ameritech product manager Chris Clayton, users must either subscribe to managed frame relay or CBDS — under which the RBOC installs and maintains WAN equipment on the customer premises — or at least allow the RBOC to perform inband SNMP monitoring of the CPE in order to be eligible.

The fee for the reports ranges from $75 to $1,000 per month, depending on network size, Clayton said.

Concord officials expect the Ameritech announcement to be the first of several in which carriers respond to demands for better frame relay network performance reports. Many user contracts include service-level agreements (SLA) under which carriers commit to a performance level, Concord president Jack Blaeser noted. Users are looking for clear documentation that the SLA specifications have been met, even rejecting some carriers' hard-to-digest text-based exception reports. "Some customers are saying, 'I'm not going to pay your bill until you give me the performance measurements on the network,' " Blaeser said. Disputes occur particularly when users find they are "bursting into a congested router," he added. ■

WAN MONITOR

The challenges of adopting ATM

Cathy Gadecki recently joined our broadband consulting staff. During the past three years, Cathy led Sprint's ATM product management group. She wrote this column based on her experience in serving ATM's leading-edge users.

The unique capabilities provided by ATM hardly fill a commonplace networking need, but for a few early adopters, ATM has emerged as the best, and sometimes only, solution.

These early adopters have successfully taken the plunge and trusted ATM to support the day-to-day communications in parts of their organization. Most are high-end users from the financial, manufacturing and defense industries as well as a few high-tech-dependent government departments.

These pioneers began their journey to ATM with a particular networking problem that they had to solve. The user issues can be grouped into the following three areas, first identified by Dan Sershen at Sprint: A bandwidth bottleneck in either the campus or WAN backbone; a new end-user application requiring the support of high bandwidth or interactive multimedia; or an unacceptable cost for supporting multiple enterprise networks.

So what does this really mean? The most common implementation of ATM is to relieve a bandwidth constraint in the campus backbone. Basically, ATM uncorks the data bottleneck with higher speeds than FDDI or 100Base-T while providing an infrastructure that can support future multimedia applications.

The second most common implementation is an ATM WAN to support a router infrastructure. A T-1 frame relay or private-line backbone is no longer sufficient to handle peak demand at the largest locations of these users.

Backbone demand continues to grow rapidly as more E-mail with large attachments and file transfers are sent from more sites. Growing installations of groupware, internal intranets and Internet access are also adding to the load.

A few users have adopted ATM to meet a network need created by a specific, new application critical to delivering the products of their business.

Implementation of ATM for these advanced applications is generally difficult to cost-justify, particularly in the WAN. But in a few cases, the new savings or revenue was sufficient.

Daniel Briere and Christine Heckart

There are very few existing implementations from the third driver group — consolidation of multiple networks to save money. However, TeleChoice expects this to emerge as the primary catalyst for ATM implementations within the next two years.

Adopting ATM today does require a large budget, deep technical expertise and perseverance. It is still a young technology with feature gaps, few engineering and design guidelines, and limited management tools.

And don't forget the cost of test equipment in your evaluation. You may find these boxes to be more expensive than one of your ATM switches.

The majority of user networks will lack the three identified ATM drivers for at least another three years. Meanwhile, early adopters are quietly implementing ATM, valuing its ability to meet a current need while positioning their network for tomorrow's growth and change.

Briere is president and Heckart is director of broadband with TeleChoice, Inc., a consultancy in Verona, N.J. They can be reached at dbriere@telechoice.com and checkart@telechoice.com.

The ODS Infinity Enterprise Switch Family

The Building Blocks of Large Corporate Networks

LAN/WAN Switching and Routing

The Infinity's switch chassis provides high-speed switching and routing modules for Ethernet, Token Ring, FDDI and ATM standard-based networks. The flexible design of the Infinity makes it the only enterprise switch chassis on the market that supports shared media modules, switched media modules, and routing modules all in the same reliable, fault-tolerant switch chassis.

Interchangeable Network Modules

The Infinity's family has three switch chassis sizes: a 4-slot for small sites of 12-192 users, a 7-slot for 12-366 users and a 12-slot for 12-576 users. The Infinity's networking modules are unique because they have a universal, re-deployable, scaleable and interchangeable design that is compatible with all three chassis sizes. This flexibility means that network managers only need to keep one set of spares for the entire network, reducing their network's cost-of-ownership by 66%.

Network Security

Security is one of the Infinity's strongest benefits. Network security is provided using several layers of protection. The Infinity uses encryption/scrambling features to provide a primary layer of defense. Additional layers are built using SNMP management and RMON capabilities. Security Logs can be built to record many different network events to a file that can be used any time to trace every packet to its originating physical port.

Advanced SNMP/RMON Management

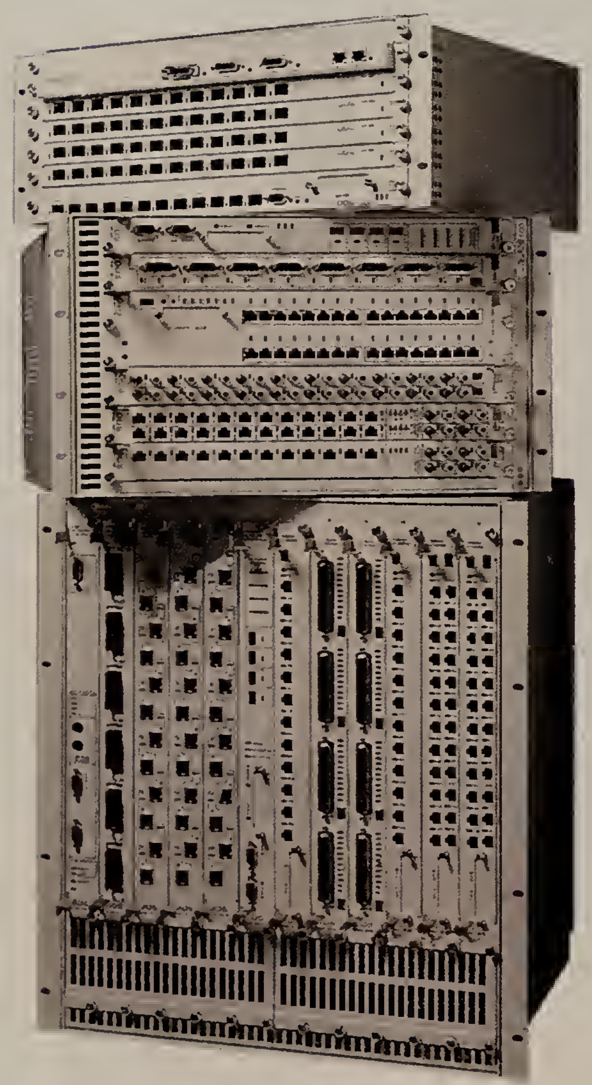
In addition to security, the Infinity's management makes it possible to prevent network failures before they happen. The Infinity's management module provides better functionality than a protocol analyzer. Instead of sending several experts to different sites with analyzers to collect data after a problem has occurred, one expert can proactively perform a multi-segment, 7-layer protocol decode on data packets from a centralized location before a problem occurs.

No Single Point-of-Failure

The Infinity enterprise switch does not have a single point-of-failure. Each switch chassis has multiple backplanes that carry data traffic and a control backplane for out-of-band management traffic. Each switch module is slot-independent, which means the loss of one or more modules will not affect the rest of the network's operation. The switch also features load-balancing power supplies, redundant data paths and hot swappable modules.

Network Design Services

ODS designs and installs very large corporate and government networks. To help customers design more efficient networks, ODS provides smart network design consulting services. ODS will send a team of engineers to visit your site, analyze your network's bandwidth requirements, listen to your business objectives, then provide a professional and honest recommendation. We'll even simulate your network's design in our 250 node testing lab to show you what you can expect from ODS.



The ODS Infinity Enterprise Switch Family

Come see our hubs
NETWORLD+INTEROP 96
at booth #704

Optical Data Systems, Inc.
1101 E. Arapaho Road
Richardson, Texas 75081
Phone: (214) 234-6400
Fax: (214) 301-5306
Internet: http://www.ods.com/

For a site analysis or a free product catalog call us today
(214) 234-6400

Circle Reader Service #49

How do you keep data, voice and video flowing?

Widen the channel.

■ By dynamically compressing voice traffic over your ATM network, Nortel's Magellan Passport frees up bandwidth to handle your increasing data networking needs. This, with the guarantee of real-time voice transmission. ■ The award-winning Magellan Passport ATM enterprise network switch accomplishes this task through the application of a unique Multiple Priority System. ■ And by widening the channel for data, your operating costs will decrease, while network capabilities increase.

■ Magellan Passport. One more way Nortel's custom-designed enterprise networks are keeping information flowing. To learn more, reach us at 1-800 4NORTEL, dept 38, or on the Internet at http://www.nortel.com. ■

NORTEL
NORTHERN TELECOM
A World of Networks
Enterprise Networks · Wireless Networks
Broadband Networks · Public Carrier Networks

©1996 Northern Telecom. Nortel, the Nortel globemark and Magellan Passport are trademarks of Northern Telecom.

*Circle Reader Service #***54**

Global Internet backbones could ease foreign price and service disparities

By Joanie Wexler

Network managers in U.S.-based multinational firms are probably noticing that the global Internet service arena is taking on a familiar sheen.

The same troublesome feature, pricing and billing disparities between telecommunications services in other countries and the U.S. are now showing up in Internet offerings. The good news: Several efforts to create one-stop-shop Internet services that solve some of these global problems are under construction from MCI Communications Corp., BBN Planet, UUNET Technologies, Inc. and others.

The problems

As has long been the case with international telecommunications services in most other countries, Internet connection speeds are slower, prices are much higher and fewer options are available than in the U.S. It can also be difficult and expensive to deal with a different Internet service provider in every country where you have a site.

Because of stricter regulations in other countries — particularly in Asia and parts of South America — there is little competition in ISP offerings. That results in higher prices and fewer service options.

For example, E-1 (2M bit/sec) is the standard backbone speed for high-end ISPs in Europe, while U.S. ISPs run nationwide backbones typically at 45M bit/sec, noted Chris Champion, an analyst with The Yankee Group Europe in London. Some U.S. ISPs are already upgrading to 155M bit/sec. And MCI has already announced plans to speed up its 155M bit/sec network core, turned on in June, to 622M bit/sec by year-end.

Telecom authorities in offshore countries have generally not been the first outfits to offer Internet services within a nation. Most, like France Telecom, which launched its first offering — Wanadoo 'Net access, online shopping and in-country directory services — in May, are only now getting into the business.

This means that most foreign ISPs are not carriers by right and still have to purchase their network circuits from the reigning phone company. This leaves them at the mercy of the type of circuits available from that company, as well as the speed and price offered by the carrier.

GLOBAL GOINGS-ON

Provider(s)	Description	Contact info
BBN Planet/Scitor	Building global BBN 'Net backbone using Scitor transport	(800) 472-4565 or http://www.bbn.com
Cable & Wireless	Offers net extension and peering service to downstream ISPs	(703) 287-6684 or http://www.cwix.net
Concert	Building global 'Net backbone through MCI-BT joint venture	mciinternet@mci.net
GRIC	Consortium of regional providers for 'Net roaming, backbone extension	(408) 567-3800 or http://www.aimnet.com
PSINet	Acquisition strategy to offer global services	(703) 709-0300 or http://www.psi.net
Telecom South America	Intranet services running on transport resold from Latin American telcos	800-711-2949
UUNET	Acquisition strategy to offer global services	703-206-5600 or http://www.uu.net

For example, few corporate customers in the U.K. buy dedicated Internet access services in the U.K., according to Eric Scace, vice president of international development at UUNET, a U.S.-based ISP that has purchased two U.K. ISPs. "It's cheaper to buy an ISDN [high-speed dial-up] link and simply leave the connection up all the time than to buy a dedicated 64K bit/sec line," he said.

U.S. telecom managers are also getting quite insistent about dealing with a single source for worldwide network services.

Backbones getting stronger

To fill that and other needs, major global Internet backbone-building is going on in the form of partnerships, acquisitions and consortia.

For its part, UUNET, based in Fairfax, Va., is on an ISP acquisition and investment binge to allow it to quickly build an international backbone. Some of its recent endeavors include the purchase of Pipex and Unipalm Group plc in the U.K. and a 40% investment in EUNET Deutschland, the top ISP in Germany.

UUNET introduced dial-up international roaming, made possible by those acquisitions, in May. And its April merger with MFS Communications Company, Inc. will give UUNET the cash and access to fiber links to further build out its infrastructure. It will also give UUNET clout with foreign phone companies from whom MFS has obtained licenses to operate as an in-country carrier — a possible way to soften the pricing gouge, Scace noted.

In a similar approach, PSINet, Inc. in Herndon, Va., has acquired ISPs in the U.K., the Netherlands, Japan, South Korea, Canada and elsewhere for a total of about 185 points of presence worldwide. UUNET runs well over 500 POPs.

In June, the Concert joint venture for global services between MCI and British Telecommunications plc said it was building a global backbone called InternetPlus. The effort combines the Internet backbones of the two companies into eight Internet "superhubs" for delivering local, uniform access to Internet and intranet services that have service-level guarantees accompanying them.

Companies now using Concert for other services are likely to jump on that bandwagon.

"Having a node in a foreign country that would let us use the Internet to access our U.S. backbone would be useful because we could eliminate costly satellite links" in remote parts of the world, said Alex Gonzalez, director of international communications at Amoco Corp. in Houston. The $30 billion petroleum and chemicals firm already uses Concert frame relay services in Hong Kong.

And BBN Planet announced a relationship with worldwide telecommunications provider Scitor Corp. in April that is technically similar to the Concert approach. The two companies are building their own Internet hubs — nine going up this quarter will cover the world, explained Mark Lunardoni, BBN service line manager. The goal is to have users pay their local access fees only.

Lunardoni said more hubs will be deployed throughout 1997, and indicated that global managed intranet and roaming services are on BBN's agenda.

Finally, Cable & Wireless, Inc. recently signed its first deal to similarly extend the reach of local ISP backbones worldwide with Erol's Internet & Computers (*NW*, Aug. 19, page 23).

The main reasons for the global backbone-building: It is very expensive for corporate sites in other countries to connect back to a POP in the U.S. to access the Internet.

Price aside, it is virtually impossible to connect late in the afternoon in Europe when the T-1s crossing the ocean are clogged. Approximately two-thirds of Internet traffic abroad travels to North American sites.

And what about south of the border? Telecom South America is preparing to soon offer intranet services throughout South America, according to Karl Faller, president of the Burlington, Vt.-based company, which focuses on network integration and service packages for U.S.-based companies with operations in Latin America.■

Global consortium and IETF lend a hand

Separate efforts spearheaded by an Internet software company in the San Francisco Bay area and the Internet Engineering Task Force (IETF) are helping to solidify worldwide Internet services.

The Global Reach Internet Consortium (GRIC), founded by Aimnet Corp. in Santa Clara, Calif., attempts to overcome the inherent disadvantage of using a regional Internet service provider: the inability of a single ISP to supply you with local connections outside the ISP's limited geographical area.

To rectify this, Aimnet is selling its Internet server software — AimTraveler authentication software and Aimnet Internet Management System — to regional, commercial-grade ISP partners worldwide. It has 11 partners online today, said Hong Chen, Aimnet president. The goal is for the partners to help one another build out infrastructure beyond their territories and to allow international roaming. These ISPs are making their points of presence available to one another to serve fixed sites outside a partner's network reach.

Aimnet's *Chen*

Roaming is also a key GRIC goal. Now, U.S. customers of Aimnet's ISP subsidiary and Asian customers signed up with SingNet, Asia Connect, Asia Online, Cyberway, HKNet and other partners can roam among those networks and be billed by their home provider.

Chen expects to have 10 more ISPs on board with GRIC in the next two months and to have the world covered with at least one local GRIC POP by year-end. GRIC will soon be adding roaming 'Net fax and telephony services to its portfolio, he said.

Aimnet has submitted its software to an IETF working group looking to standardize how users roam among different ISPs' nets. The IETF seeks to standardize the protocol format for exchanging user information, passwords and encryption algorithms. Also included will be standard ways for handling user accounting information, billing and the structure of a phone directory.

—*Joanie Wexler*

Local Networks

Covering: Operating systems • LAN management
Hubs • Switches • Adapters and other equipment

Briefs

First Virtual Corp. (FVC) *enhanced its family of V-Gate products last week with an* **ATM Primary Rate Interface ISDN gateway.** *The V-Gate 3000 allows ISDN lines to be shared among desktop videoconferencing workstations, eliminating the need to install expensive ISDN lines to each desktop. The V-Gate 3000 is available now and is priced at $12,000 for a system that includes both 25M bit/sec ATM and PRI interface connections.*

FVC: (408) 988-7070.

3Com Corp. *last week bolstered its OfficeConnect products for the small business or remote branch with a new* **Fast Ethernet hub.** *The OfficeConnect Hub 8/TP100 — which provides 100M bit/sec links to power users — is an unmanaged hub with eight 100Base-T ports. It is priced at $1,995 and is available now.*

3Com: (408) 764-5000.

Digital Equipment Corp. *last week rolled out three* **workgroup Ethernet and Fast Ethernet switches,** *including an eight-port, 10M bit/sec switch for $995 and a two-port, 10/100M bit/sec autosensing switch priced at $1,249. The third product, the EtherWorks Switch 6T/2TX, has five Ethernet ports and two 100Base-T links and is priced at $2,599. All will be available next month.*

Digital: (508) 493-5111.

Transition Networks, Inc. *last week unveiled a stackable* **port-switch hub** *to help balance workgroup traffic loads without deploying expensive dedicated switched links. The StackMaster Pro 2000 provides 22 Ethernet ports along with two management ports.*

Transition: (612) 941-7600.

A year later, WinNT still in Win95's way

But Microsoft still has big plans for Windows 95.

By Christine Burns
Redmond, Wash.

Talk about a sibling rivalry.

Even as Microsoft Corp. last week celebrated the first anniversary of its Windows 95 launch, word among customers and industry observers was that Windows NT 4.0 will crowd its 32-bit sister out of large corporate accounts.

Microsoft has shipped 40 million copies of Windows 95 to date, according to financial analyst Scott Reamer of Bear, Sterns & Company, Inc. in New York. About 29 million copies were packaged with new PCs and shipped via Microsoft's OEM channel and another 10 million were sold in retail stores, he said. Only one million copies were sold directly to corporate users, Reamer added. Still, last year's Windows NT Workstation 3.51 sales pale in comparison to those numbers. Reamer estimated that Microsoft only sold 1.5 million copies of NT Workstation in fiscal 1996.

The Fortysometning club

As of the first anniversary of Windows 95's launch last week, Microsoft had shipped about 40 million copies of the 32-bit desktop operating system. Other well known products to hit this milestone include:

- ▶ *Snow White, Jurassic Park, Batman* and *Bambi* combined video sales
- ▶ Japanese cars sold in the U.S. in the past 25 years
- ▶ Michael Jackson's *Thriller* total worldwide sales
- ▶ Dr. Spock's *Baby and Child Care* total worldwide book sales
- ▶ Records sold by the Moody Blues over the past 20 years
- ▶ Total number of Tetris games sold worldwide
- ▶ *Les Miserables* total worldwide ticket sales

SOURCE: MICROSOFT, REDMOND, WASH.

However, customers anticipate more widespread deployment of Windows NT 4.0 this year and beyond. They like its improved connectivity features and new user interface, and predict that business use of Windows 95 will be relegated to laptop and home office machines that have ties to the corporate network.

Rick Shope, manager of PC technology and planning at Chicago Research and Trading (CRT), an arm of Charlotte, N.C.-based NationsBanc Corp., said only 100 of CRT's 900 desktop machines are running Windows 95. The rest run NT 3.51 and 4.0, he said.

''Deploying Windows 95 was not part of our corporate direction here,'' Shope said. ''In the final evaluation, NT just seemed a lot more robust. The file system is better, it is less prone to crashing and it integrates with our Unix environment a lot easier.''

The majority of Windows 95 deployment at CRT is to accommodate existing PC hardware that could not support Windows NT and to run 16-bit applications that users still need. ''I really felt Windows 95's niche was backward compatibility. But moving forward, it's definitely Windows NT,'' Shope said.

''Forty million [copies of Windows 95] is a big number, but you have to look at where those licenses are sitting. They are on laptops, in people's home offices and being used to play games. They are not on every desktop in every Fortune 500 firm,'' said Jason Perlow, a systems engineer with New Technology Partners, a systems integration firm in Bedford, N.H. ''[Business customers] have been waiting for a full-purpose client/server operating system and for Windows NT to become more palatable in that space.''

William Rankin, a consulting engineer with Vanstar Corp., a systems integrator in Pleasanton, Calif., said he has worked with a handful of corporate customers deploying Windows 95 in a big way.

In many cases, Windows 95 was selected over Windows NT because the hardware requirements are smaller, it is cheaper and it offers a better migration path for Windows 3.X applications, Rankin said.

''But quite honestly, there are many more customers still holding off on making the migration to Windows 95,'' Rankin said. ''They are using Windows 3.X and waiting for the applications they need to be released as 32-bit versions, and the price of machines necessary to support Windows NT to come down.''

Don't write off Win95

Microsoft contends that Windows 95 cannot be so easily written off as a loser in the corporate world.

''There will be a surge of NT sales, but Windows 95 will continue to be the dominant operating system in both the retail and OEM channel for the foreseeable future,'' said Adam Taylor, group product manager in the desktop and business systems division at Microsoft.

''NT workstation was a solid release and big milestone, but Windows 95 just has more of a range of compatibility with more users out there,'' he said.

Microsoft is readying its first revision of Windows 95, which should be on retail shelves by year-end. With this upgrade, customers will gain access to large shared disk drives, better management of more powerful PC cards, stable ISDN hooks, imaging capabilities and support for dial-in diagnostic help from Microsoft.

Check out more articles about Windows software on Network World Fusion, including:
- ● **Why corporate users haven't rushed to Windows 95**
- ● **Planned upgrades to Windows 95**
- ● **The latest on Windows NT 4.0**

NetworkWorld Fusion
Select News+.

While Microsoft is continuing to develop Windows 95, it is also making moves to narrow the differences between it and Windows NT. For example, Windows NT 4.0 will ship with the Windows 95 interface.

In addition, Microsoft is working on a common device driver model, and will include the popular plug-and-play feature of Windows 95 in the next major release of NT expected late next year. ■

HP adds to Pentium Pro server line

By Sari Kalin
Boston

This week's newest addition to Hewlett-Packard Co.'s Pentium Pro NetServer line is aimed at customers who want scalability but do not need lots of storage right away.

The LXe Pro will offer six hot-swappable drive bays for as much as 54.6G bytes of storage, along with two redundant power supplies, officials said. It will be upgradable to a top-of-the-line LX Pro by adding six more storage bays and one more power supply.

Less storage capacity translates into lower prices, HP officials said. The 166-MHz-based LXe is priced at $10,900, vs. the 166-MHz LX Pro's $12,500 price tag. The 200-MHz-based LXe costs $12,750, compared to $14,130 for the 200-MHz LX Pro.

Both new models offer 512K bytes of cache per processor, dual peer PCI buses, as much as 2G bytes of error correcting code memory and dual SCSI backplanes. They will be available Sept. 1.

The lower priced LXe models will be attractive for some organizations' E-mail and database applications, which do not demand all the storage of the LX Pro, according to Lynda Fitzpatrick, an analyst at International Data Corp. in Framingham, Mass.

©HP: (415) 857-1501.

Kalin is a Boston bureau correspondent with the IDG News Service.

IT'S ONLY LOGICAL THAT INTELLIGENT MANAGEA

(NOW, WHAT THE HECK IS I

Intelligent Manageability is kind of like Extra Sensory Perception for a computer and every new Compaq Deskpro has it. It lets you know if something's going to happen before it actually does. This way you can manage all of the desktops on your network from one location.

Taking inventory, for instance, of all hardware and software is done simply and efficiently from one Deskpro. Or if a hard drive's about to fail anywhere, you'll know ahead of time. As before, Intelligent Manageability backs up your data on the network in case of failure; but now, thanks to our new PD-CD drive backup, it also preserves your data locally.

Okay, so our newest version of Intelligent Manageability is smart. But affordable? Considering that the Deskpro line from Compaq starts at around $1,100,* we think so.

Equally impressive are the high-performance features. Up to Pentium® Pro 200 processors. Choice of PCI graphics. Plus a choice of EIDE and Ultra SCSI hard drives.**

And maintenance? That's easy

I'm burnt.
I need a vacation.

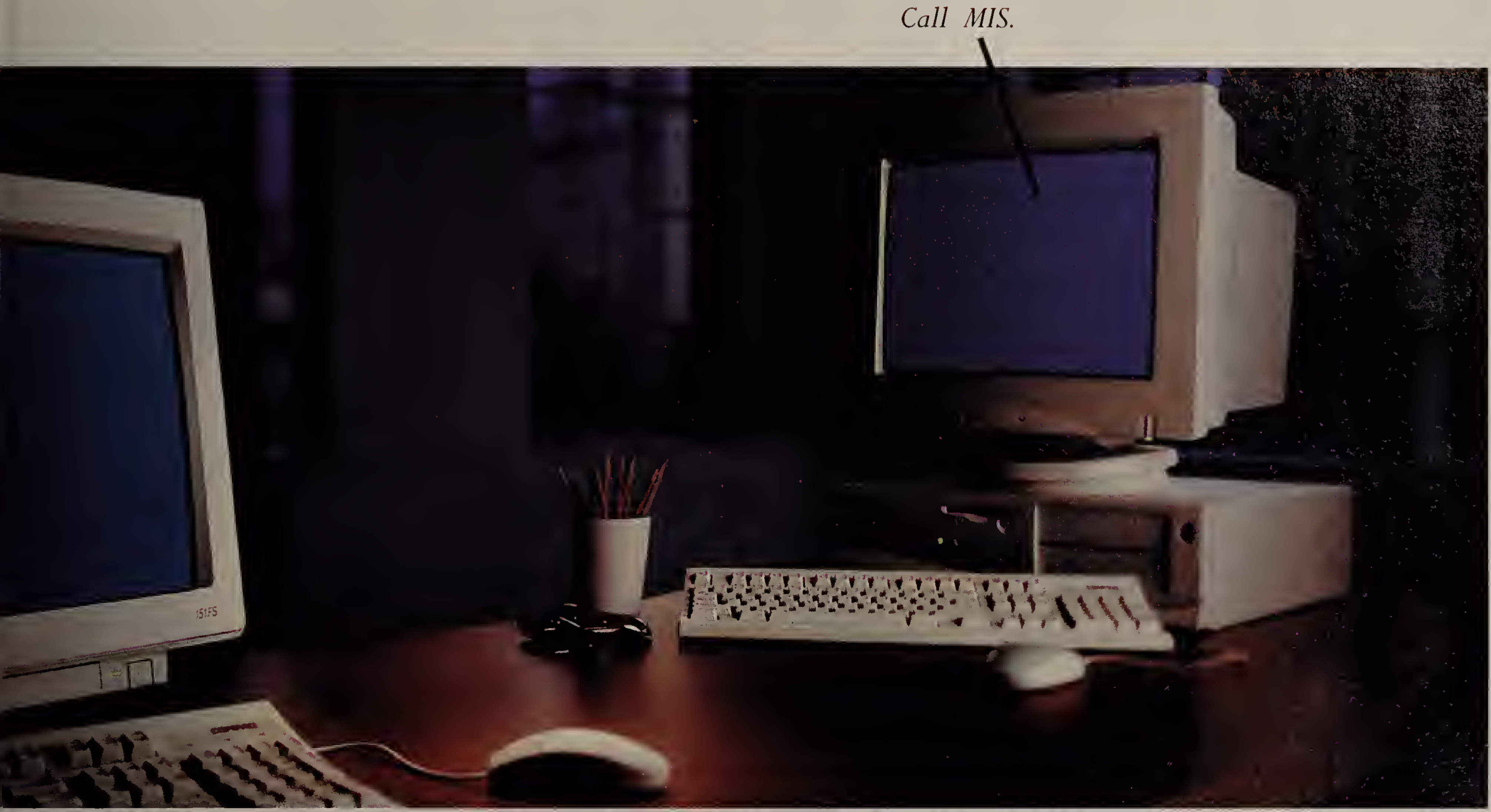
because we deliver continually updated support software via our Web site and CDs. And so is upgrading and servicing, thanks to a quick-release CPU hood and accessible components.**

In the end, Intelligent Manageability gives you a lowered cost of

PENTIUM®PRO PROCESSOR

©1996 Compaq Computer Corporation. All rights reserved. Compaq and Deskpro registered U.S. Patent and Trademark Office. Deskpro is covered by our 3-year limited warranty. *Price mentioned is estimated street price. Dealer prices may v
are registered trademarks and the Pentium Processor Logo and the Pentium Pro Processor Logo are trademarks of Intel Corporation. Other products mentioned may be trademarks or registered trademarks of their respective companies.

ILITY ALSO COMES WITH AN INTELLIGENT PRICE.
TELLIGENT MANAGEABILITY?)



ownership, a three-year warranty and dedicated toll-free technical support that's open for business seven days a week, 24 hours a day. And what could possibly be more logical than that? For more, visit us at www.compaq.com or call 1-800-392-8883.

COMPAQ

Has It Changed Your Life Yet?

atures vary by model. Monitor not included. Thermal sensor available only on Deskpro 4000 and 6000. Some features available with Compaq Deskpro and independent software applications. Other features only available with Windows 95. The Intel Inside Logo and Pentium

WIRED WINDOWS

For Windows 95, it's been a good year

It was just one year ago that Windows 95 — once known as Chicago — finally shipped.

Never before had a computer product, especially an operating system, generated so much prerelease comment among both users and the press. Never before had so many people run beta code of a product before its release.

So one year later, what can we say about Windows 95?

First, the operating system is remarkably solid and clean. There were no significant bugs in the product, and few insignificant ones. The only major fix released solved a security issue in certain circumstances.

News reports recently have said Windows 95 wasn't meeting first-year sales expectations. But these were never Microsoft's own expectations.

Rather, that amorphous group called "industry analysts" had predicted outrageously large first-year sales, and were proven wrong. Regardless, Windows 95 set records for first-year sales of an operating system that should stand for quite some time.

Many hardware and software companies blamed their poor showings over the past year on the less-than-predicted sales of Windows 95. It's always nice to have a scapegoat.

Increased competition, along with customers who refused to be caught up in a faster upgrade spiral, are the root causes of these slowdowns. Even one year later, many customers are dragging their feet at upgrading all of their software — especially since their 16-bit Windows 3.X applications are running quite well on Windows 95.

Initially, corporate sites were reluctant to roll out Windows 95. But lately, I'm seeing more of Windows 95 on corporate desktops, with many sites rolling it out just as quickly as possible. PC managers cite the bug-free, stable nature of the product as a big reason why. Also, retraining of end users has not been that big of an issue.

Dave Kearns

One other prerelease showstopper has also disappeared. Many businesses had set a game plan to eventually move to Windows NT on the desktop, and considered Windows 95 a dead-end turn on that road map. The release of Windows NT 4.0, sporting the Windows 95 graphical user interface, however, now positions 95 as a good interim training ground on the way to the NT desktop.

Has Windows 95 been flawless? Well, there was one big one problem: Microsoft unfortunately chose to tie the release of Windows 95 to the release of the Microsoft Network, which was going to revolutionize online services. As late as December of last year, Microsoft was still claiming no interest in the Internet. As anyone who hasn't been asleep for the last eight months knows, that's all changed.

Much of what Microsoft has done since Aug. 24, 1995, has been rightly denigrated. But Windows 95 remains its best achievement of the past three years.

Tip of the week

I had help with this week's column from ClubWin members Helen O'Boyle, Michael Eber, Carl DeVaughn, Greg Carter, Jim Irwin and Gerald Kelly. For more Win95 information, check their Web sites as well as those of other ClubWin members by jumping off from http://www.clubwin.com/ and clicking the "links" button.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at dkearns@msn.com.

DIGEX =

FAULT-TOLERANT NATIONWIDE DS-3 NETWORK

The Internet waits for no one. If your business is serious about taking advantage of everything the Internet has to offer, call DIGEX today. We provide superior technical performance backed by the best 24x7 customer service in the business. We are the business Internet experts. Call us on it.

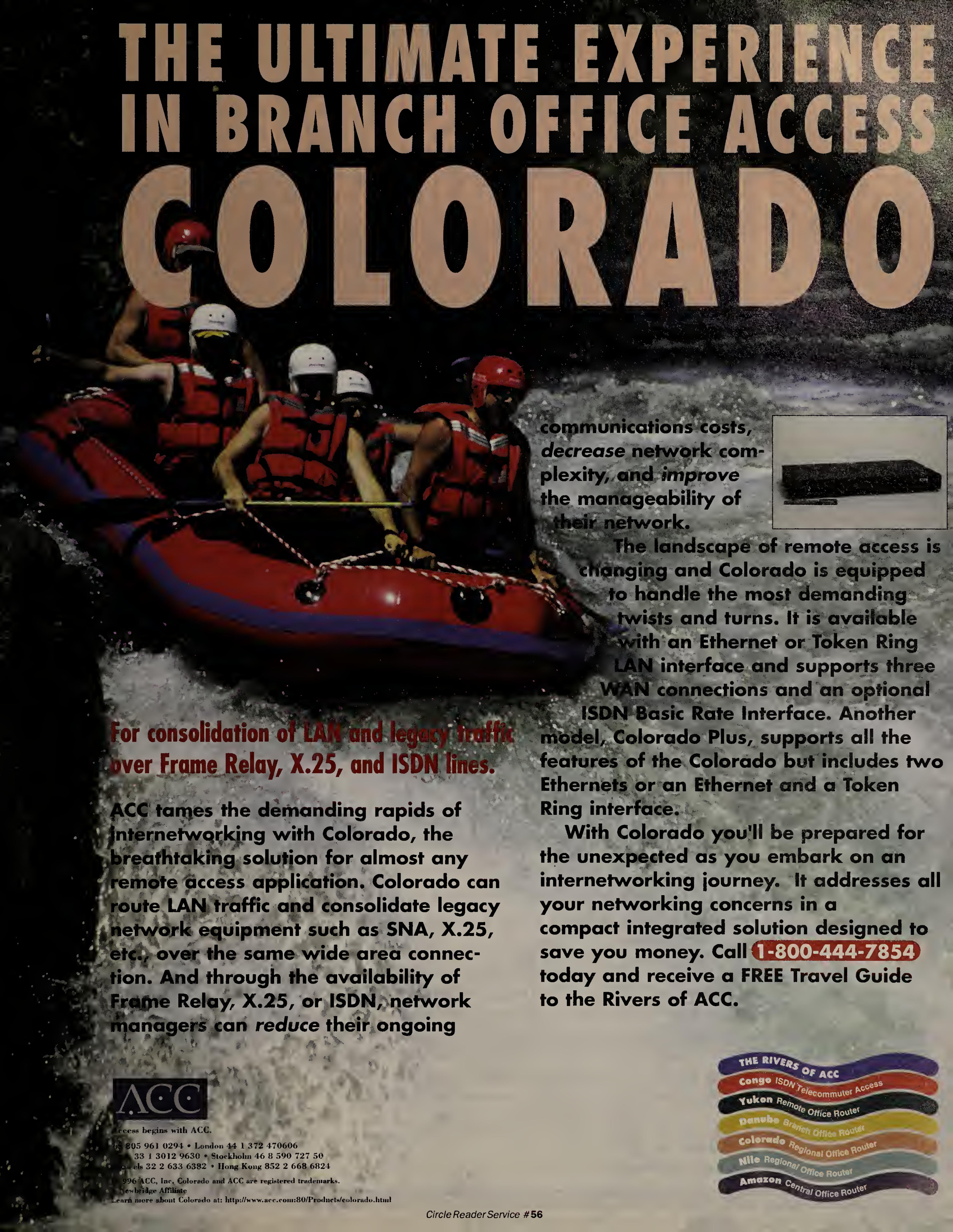
DIGEX℠ BUSINESS INTERNET

Specialized Business Internet Solutions Now.

1-800-99-DIGEX

www.digex.net

Circle Reader Service #45



THE ULTIMATE EXPERIENCE IN BRANCH OFFICE ACCESS

COLORADO

For consolidation of LAN and legacy traffic over Frame Relay, X.25, and ISDN lines.

ACC tames the demanding rapids of Internetworking with Colorado, the breathtaking solution for almost any remote access application. Colorado can route LAN traffic and consolidate legacy network equipment such as SNA, X.25, etc., over the same wide area connection. And through the availability of Frame Relay, X.25, or ISDN, network managers can *reduce* their ongoing communications costs, *decrease* network complexity, and *improve* the manageability of their network.

The landscape of remote access is changing and Colorado is equipped to handle the most demanding twists and turns. It is available with an Ethernet or Token Ring LAN interface and supports three WAN connections and an optional ISDN Basic Rate Interface. Another model, Colorado Plus, supports all the features of the Colorado but includes two Ethernets or an Ethernet and a Token Ring interface.

With Colorado you'll be prepared for the unexpected as you embark on an internetworking journey. It addresses all your networking concerns in a compact integrated solution designed to save you money. Call 1-800-444-7854 today and receive a FREE Travel Guide to the Rivers of ACC.

ACC

Access begins with ACC.

805 961 0294 • London 44 1 372 470606
33 1 3012 9630 • Stockholm 46 8 590 727 50
Brussels 32 2 633 6382 • Hong Kong 852 2 668 6824

© 1996 ACC, Inc. Colorado and ACC are registered trademarks.
Newbridge Affiliate
Learn more about Colorado at: http://www.acc.com:80/Products/colorado.html

THE RIVERS OF ACC
- **Congo** ISDN Telecommuter Access
- **Yukon** Remote Office Router
- **Danube** Branch Office Router
- **Colorado** Regional Office Router
- **Nile** Regional Office Router
- **Amazon** Central Office Router

Circle Reader Service #56

GET NETServer '96.™

The simple, most cost-effective remote LAN access solution.

Keep growing quickly and effortlessly with NETServer – the remote access solution that's easy on your budget. Integrated modems and a remote access server in one box give remote users access to the Internet, a company Intranet, and any networked office environment. NETServer's unique integrated design eliminates excess cables, reduces additional investments, and simplifies maintenance. U.S. Robotics' NETStarter™ auto configuration wizard gets your network up and running in minutes. Plus, NETServer comes bundled with Stampede's award-winning Remote Office Gold Client software, giving you seamless remote node and remote control connectivity. Bank on U.S. Robotics, a proven technology leader, to access a future without limits.

#1 IN REMOTE ACCESS*

1.800.877.7533 ext. 6973
http://www.usr.com/business

U.S.Robotics®
The Intelligent Choice in Information Access
NETWORK SYSTEMS DIVISION
Office Access Products Group

REMOTE LAN ACCESS • ISDN • LAN SWITCHING • TRANSACTION PROCESSING • FRAME RELAY • TELEPHONY PRODUCTS • MODEMS • WIRELESS ACCESS • SOPHISTICATED NETWORK MANAGEMENT

*U.S. Robotics recognized as #1 in remote access by Dell'Oro Group Router and Remote Access Report IQ 1996

Circle Reader Service **#51**

© 1996, U.S. Robotics, Inc. All rights reserved.

NET RESULTS

Gigabit Ethernet taking over the world

It's official. The numbers are in. Gigabit Ethernet will take over the U.S., third-world, European and even Martian markets.

At $2.9 billion, Gigabit Ethernet revenue in the year 2000 will be larger than that for the Ethernet market today — and the Gigabit Ethernet standard won't be done until the end of 1998.

Is this feasible? Not really. Is it probable? Not likely.

So what's going on?

This is actually a well-documented occurrence that we call the New Technology Syndrome.

It only occurs when the following things are true:

1. There is a new or partially new LAN technology.
2. There are few options currently on the market.
3. There is one primary competitive offering.
4. Most vendors do not have the primary competitive offering.
5. There is minimal controversy surrounding the market and technology as a whole.

Skip MacAskill and Melinda Le Baron

These have all come together at this time, and they are surrounding Gigabit Ethernet.

Here's the situation:

1. Gigabit Ethernet is the new LAN technology.
2. There are few high-speed backbone options out on the market.
3. The primary competitive offering is ATM.
4. Many vendors have no ATM offering, get their ATM technology through an OEM agreement or have a non-competitive subset of ATM products.
5. Controversy in the market is minimal. Switching and routing are now coming together to form a new version of the collapsed backbone router. And there is little controversy over ATM because the marketing people and the press have done their job well, and many network managers see ATM as the strategic move for backbone networks. Some are implementing now, and others have plans to implement in the future.

So the forces have aligned, and we now have Gigabit Ethernet taking over the known free world.

You might remember other examples of Godzilla technologies that were slated to conquer the world.

There were two separate occasions when token ring was due to overtake Ethernet and become the favorite of network managers everywhere.

This, of course, did not happen once, but twice. Despite the headlines and the vendor hype,

Ethernet has remained the most installed LAN technology. Network managers vote with their purchase orders, and they obviously are not affected by this New Technology Syndrome.

Now we have Gigabit Ethernet. The pundits and vendors say it will kill ATM and make all the technology advancements for quality of service and multimedia networking useless.

Gigabit Ethernet is also supposed to kill routing, FDDI and other proposed backbone technologies.

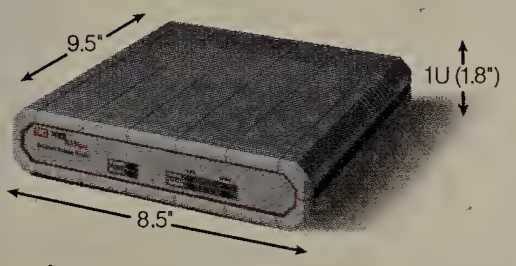
Our take is that this is another example of New Technology Syndrome. New technologies tend to ramp up on a rather consistent curve, and no technology has ever performed in the market like the estimates for Gigabit Ethernet. So chalk this one up to the convergence of disciplines, and in a few years when product is really shipping, look back at this information and smile.

MacAskill is a senior research analyst and Le Baron is a research director in Gartner Group, Inc.'s Network Computing Infrastructure group. They can be reached at (203) 316-1111 or at inquiry@gartner.com.

Headline:

An internet access server for every WAN.
(Frame Relay, ISDN, PSTN ...)

Photo:

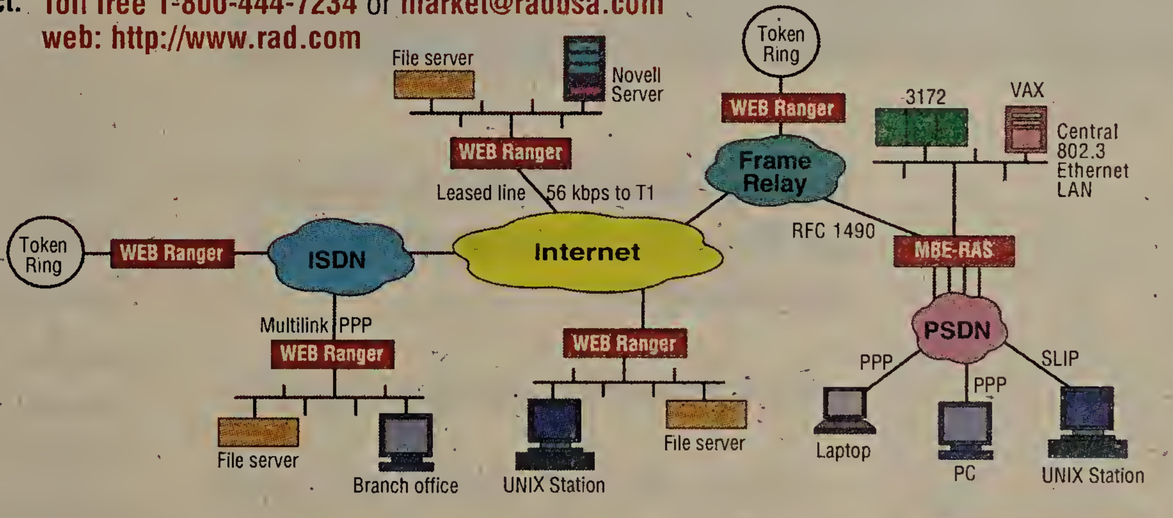


Product name: WEB Ranger

Product description: Remote access/ internet access router

Product benefit: Low-cost access router connecting Ethernet or Token Ring LANs over any WAN service: frame relay, ISDN and dial-up lines, DDS, Fractional TI, and T1 lines, with integral CSU/DSU. Ideal for attaching SOHOs to the internet service provider (ISP) or POP, or to private IP networks. Unique option enables connection of a remote IP Network to the internet via single IP address. IP routing over PPP is implemented opposite any third party router. Multilevel security features including firewall. TELNET and SNMP agent for management with RADview, or any standard management station. A member of RAD's family of remote access products.

Contact: Toll free 1-800-444-7234 or market@radusa.com
web: http://www.rad.com



Boring ads. Brilliant solutions.

RAD
data communications

RAD Data Communications, Inc.
e-mail: market@radusa.com Toll Free: 1-800-444-7234
U.S. Headquarters: 900 Corporate Drive, Mahwah, NJ 07430 Tel: 201/529-1100 Fax: 201/529-5777 Midwest: Tel: 847/342-9999 Fax: 847/342-9986
West Coast: Tel: 714/897-2448 Fax: 714/891-1764 International Headquarters: 8 Hanechoshet Street, Tel Aviv 69710 Israel Tel: 972-3-6458181 Fax: 972-3-6498250

Circle Reader Service **#58**

ANNOUNCING THE FIRST ALL-IN-ONE FRAME RELAY SOLUTION

CX 900 From $1,695

Enough versatility and economy to be your remote office access solution. Enough power to be your main office switch. The modular, multi-protocol Thunderbolt™ CX900 is the first total internetworking solution available in a single unit!

Because it transmits SNA and legacy protocols, the CX900 allows users to migrate expensive dedicated networks to Frame Relay without any change to their system configuration. The highly adaptable CX900 also transmits LAN, toll-quality voice and fax traffic over existing Frame Relay circuits and provides V.34 dial back-up and full ISDN support. A single CX900 can support speeds from 56k to T1/E1 for your most demanding throughput requirements. Its 6-slot modular architecture allows for easy and inexpensive system growth at both remote and central sites. And its any-to-any conversion capability makes it the ideal solution for migrating to new technology.

The speed and reliability of digital transmission. Savings of up to 50% over dedicated networks. The ability to consolidate multiple transmission services in a single unit. Smooth transition to new technology. Call MEMOTEC and find out why the Thunderbolt CX900 is the most adaptable and cost-effective Frame Relay solution on the market today!

The Thunderbolt CX900 belongs in any Wide Area Network where users are looking to:

- Migrate SNA and legacy protocols to Frame Relay
- Consolidate legacy data, LAN, voice and fax traffic
- Reduce heavy leased line cost
- Efficiently manage multiple transmission services and evolving communication requirements

MEMOTEC
Adaptive Solutions For Evolving Networks

MEMOTEC COMMUNICATIONS INC. 600 MCCAFFREY STREET. MONTREAL, QUEBEC. CANADA H4T 1N1 TEL: 800-570-MEMO, 514-738-4781 **http://www.memotec.com**

*Circle Reader Service #***48**

APPLICATION FOR FREE SUBSCRIPTION

☐ Yes! I want my FREE subscription to *NetworkWorld*. ☐ No, Thank You.

Sign Here ____
Signature **Date**

To qualify: You must supply your company name and address.

Name ______________________________ Title ____________

Company ____

Address ____

City ______________________________ State _____ Zip ______

Business phone (_______) ______________________________

Business FAX (_______) ________________________________

Internet address ______________________________________

If there is a parent company, please provide name and address:

____
Street Address City State Zip

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

☐ My home address is also my business address.

Optional delivery address:
Enter your home address below if your company will not accept delivery at your business address:

____
Street address City State Zip

If military, please specify branch and base: ______________________________

If government, please specify division: ______________________________

Do you wish to receive Intranet Magazine? ☐ Yes ☐ No

Publisher reserves the right to serve only those individuals who meet publication qualifications. Incomplete forms will not be processed 9601

1 Industry: (check one only)

01. ☐ Manufacturers (other)
02. ☐ Finance/Banking
03. ☐ Insurance/Real Estate/Legal
04. ☐ Health Care Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable/Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
09. ☐ Utilities
10. ☐ Education
11. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
12. ☐ Government (Federal/State/Local)
13. ☐ Military
14. ☐ Aerospace
15. ☐ Consultants (Independent)
16. ☐ Carriers/Interconnects
17. ☐ Manufacturers (Computer/Communications)
18. ☐ Resellers of Computer/Network Products (VARs, VADs)
19. ☐ Systems/Network Integrators
20. ☐ Distributors (Computer/Communications)
21. ☐ Other *(please specify)* ______________

2 What is your job function? (check one only)

NETWORK IS MANAGEMENT:

1. ☐ Networking Management
2. ☐ LAN Management
3. ☐ Datacom/Telecom Management
4. ☐ IS, IT, MIS, Systems Management
5. ☐ Engineering Management
6. ☐ Corporate Management (CIO, CEO, Pres., VP, Dir., Mgr., Financial Management)
7. ☐ Consultant (Independent)
8. ☐ Other *(please specify)* ______________

3 What is the total number of sites for which you have purchase influence? (check one only)

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1
7. ☐ None

4 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE (check one only)
1. ☐ Corporate/Enterprise
2. ☐ Department
3. ☐ None

B. INVOLVEMENT (check all that apply)
1. ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4. ☐ Determine the need
5. ☐ None

5 Check ALL that apply in Columns A and B:

A. I am involved in the purchase of the following products/services:
B. I plan to purchase the following products/services:

A B
☐ 100 ☐ **LOCAL-AREA NETWORKS**
☐ 01. ☐ Local-Area Networks
☐ 02. ☐ Network Op. Sys. Software
☐ 03. ☐ LAN Storage/Backup
☐ 04. ☐ Optical LAN Storage/Backup
☐ 05. ☐ Disk LAN Storage/Backup
☐ 06. ☐ Tape LAN Storage/Backup
☐ 07. ☐ RAID LAN Storage/Backup
☐ 08. ☐ Network Test/Diagnostic Tools
☐ 09. ☐ Cables, Connectors, Baluns
☐ 10. ☐ UPS
☐ 11. ☐ Network Interface Cards
☐ 12. ☐ Peer-to-Peer LANs
☐ 13. ☐ SNMP Network Management
☐ 14. ☐ ATM Switches
☐ 15. ☐ Token-Ring Switches
☐ 16. ☐ Ethernet Switches
☐ 17. ☐ Remote LAN Access/Communications Servers
☐ 18. ☐ Superservers
☐ 19. ☐ File/Application Servers
☐ 20. ☐ Print Servers/Fax Servers
☐ 21. ☐ CD-ROM Servers
☐ 22. ☐ LAN Servers

A B
☐ 101 ☐ **INTERNETWORKING**
☐ 23. ☐ Bridges
☐ 24. ☐ Routers
☐ 25. ☐ Bridge/Router
☐ 26. ☐ Gateways
☐ 27. ☐ Intelligent Hubs
☐ 28. ☐ Stackable Hubs

A B
☐ 102 ☐ **COMPUTERS/PERIPHERALS**
☐ 29. ☐ Laptops/Notebooks/Sub-Notebooks
☐ 30. ☐ Micros/PCs
☐ 31. ☐ Minis
☐ 32. ☐ Mainframes
☐ 33. ☐ Workstations
☐ 34. ☐ Terminals
☐ 35. ☐ Printers/Network Printers
☐ 36. ☐ Cluster Controllers
☐ 37. ☐ CD-ROM
☐ 38. ☐ Fax/Modem Boards

A B
☐ 103 ☐ **REMOTE/WIRELESS COMPUTING**
☐ 39. ☐ PDAs
☐ 40. ☐ PCMCIA Devices
☐ 41. ☐ Wireless Data Services
☐ 42. ☐ Wireless Data Equipment
☐ 43. ☐ Wireless LANs
☐ 44. ☐ Cellular Equipment & Services

A B
☐ 104 ☐ **INTERNET/INTRANET**
☐ 45. ☐ Internet Access Service
☐ 46. ☐ Firewalls/Security
☐ 47. ☐ Web Servers
☐ 48. ☐ Web Browsers
☐ 49. ☐ Intranet Applications/Groupware
☐ 50. ☐ Search Retrieval Products (web crawler)
☐ 51. ☐ Internet Development Tools
☐ 52. ☐ Internet Commerce Tools

A B
☐ 105 ☐ **SOFTWARE/APPLICATIONS**
☐ 53. ☐ Network Management
☐ 54. ☐ Systems Management
☐ 55. ☐ Security
☐ 56. ☐ Communications Software
☐ 57. ☐ Terminal Emulation
☐ 58. ☐ Word Processing
☐ 59. ☐ Operating Systems
☐ 60. ☐ Client/Server Applications Development
☐ 61. ☐ Database Management/RDBMS
☐ 62. ☐ Spreadsheet
☐ 63. ☐ Groupware
☐ 64. ☐ EDI
☐ 65. ☐ E-mail
☐ 66. ☐ Windows/Graphical User Interface
☐ 67. ☐ Multimedia
☐ 68. ☐ Graphics/DTP
☐ 69. ☐ Remote Access
☐ 70. ☐ Imaging
☐ 71. ☐ Server Suites (Backoffice, etc.)
☐ 72. ☐ Suites
☐ 73. ☐ Middleware
☐ 74. ☐ Document Management
☐ 75. ☐ Database Server
☐ 76. ☐ Site Metering Tools
☐ 77. ☐ Computer-Integrated Telephony (CIT)

A B
☐ 106 ☐ **WIDE-AREA NETWORK EQUIPMENT & SERVICES**
☐ 78. ☐ Frame Relay Equip./Services
☐ 79. ☐ Modems
☐ 80. ☐ FT-1/T-1/T-3 Multiplexers
☐ 81. ☐ FT-1/T-1/T-3 Services
☐ 82. ☐ SONET
☐ 83. ☐ Inverse Multiplexers
☐ 84. ☐ SMDS
☐ 85. ☐ Asynchronous Transfer Mode
☐ 86. ☐ Diagnostic/Test Equipment
☐ 87. ☐ DSU/CSU
☐ 88. ☐ VSAT/Satellite
☐ 89. ☐ ISDN Equipment & Services
☐ 90. ☐ PBXs
☐ 91. ☐ Voice Mail/Response
☐ 92. ☐ Videoconferencing
☐ 93. ☐ Leased Lines
☐ 94. ☐ Switched Data
☐ 95. ☐ E-mail
☐ 96. ☐ 800/900/MTS Services
☐ 97. ☐ Virtual Networks
☐ 98. ☐ Outsourcing/Systems Integration Services
☐ 99. ☐ Education/Training Services

☐ 107 ☐ None of the above (1-99)

B10896

6 What is the total number of LANs, workstations/nodes at this location/in your organization?

At this location:

		LANs	Workstations/ Nodes
1.	☐	5,000+	☐
2.	☐	1,000 - 4,999	☐
3.	☐	100 - 999	☐
4.	☐	50 - 99	☐
5.	☐	10 - 49	☐
6.	☐	1 - 9	☐

Entire organization:

		LANs	Workstations/ Nodes
1.	☐	5,000+	☐
2.	☐	1,000 - 4,999	☐
3.	☐	100 - 999	☐
4.	☐	50 - 99	☐
5.	☐	10 - 49	☐
6.	☐	1 - 9	☐

7 Check ALL that apply in Columns A and B:

A. The following network platforms are currently installed:
B. The following network platforms are planned for purchase:

A B
☐ 55 ☐ NETWORK PROTOCOLS
☐ 01. ☐ SNA
☐ 02. ☐ DECnet
☐ 03. ☐ TCP/IP
☐ 04. ☐ Novell IPX/SPX
☐ 05. ☐ APPC/APPN/LU 6.2
☐ 06. ☐ NETBIOS
☐ 07. ☐ AppleTalk
☐ 08. ☐ NFS
☐ 09. ☐ IPv6
☐ 10. ☐ SNMP/SNMPv2
☐ 11. ☐ Other *(please specify)* ______________

A B
☐ 56 ☐ NETWORK OPERATING SYSTEM
☐ 12. ☐ Microsoft (LAN Manager)
☐ 13. ☐ Novell (NetWare 2.X, 3.X)
☐ 14. ☐ Novell (NetWare 4.X)
☐ 15. ☐ Windows NT
☐ 16. ☐ Windows NT/Advanced Server
☐ 17. ☐ LocalTalk (AppleTalk)
☐ 18. ☐ Banyan (VINES)
☐ 19. ☐ IBM (LAN Server)
☐ 20. ☐ IBM (PC LAN Program)
☐ 21. ☐ Artisoft (LANtastic)
☐ 22. ☐ Digital (Pathworks)
☐ 23. ☐ Other *(please specify)* ______________

A B
☐ 57 ☐ LAN ENVIRONMENT
☐ 24. ☐ 4M Token Ring
☐ 25. ☐ 16M Token Ring
☐ 26. ☐ Ethernet
☐ 27. ☐ Fast Ethernet
☐ 28. ☐ 100vg Any LAN
☐ 29. ☐ FDDI
☐ 30. ☐ LocalTalk
☐ 31. ☐ 10Base-T
☐ 32. ☐ ATM
☐ 33. ☐ Other *(please specify)* ______________

A B
☐ 58 ☐ COMPUTER OPERATING SYSTEM
☐ 34. ☐ DOS
☐ 35. ☐ Unix/Xenix/AIX
☐ 36. ☐ OS/2
☐ 37. ☐ OS/2 Warp
☐ 38. ☐ IBM MVS
☐ 39. ☐ IBM VM
☐ 40. ☐ Digital VMS
☐ 41. ☐ Macintosh
☐ 42. ☐ Windows
☐ 43. ☐ Windows 95
☐ 44. ☐ NT
☐ 45. ☐ Solaris
☐ 46. ☐ Other *(please specify)* ______________

☐ 47. ☐ None of the above (1-46)

8 For which areas outside of North America do you have purchase influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East
6. ☐ None

9 Please indicate your involvement in developing/implementing Internet/Intranet Technologies: (check all that apply)

1. ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4. ☐ Determine the need
5. ☐ Implement
6. ☐ None

10 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

	Mainframes	
	A – Installed	B – Planned
1. IBM	☐	☐
2. Amdahl	☐	☐
3. Cray	☐	☐
4. Hitachi	☐	☐
5. Unisys	☐	☐

	Minis	
	C – Installed	D – Planned
1. IBM	☐	☐
2. Digital	☐	☐
3. Tandem	☐	☐
4. Unisys	☐	☐
5. AT&T GIS	☐	☐
6. HP	☐	☐
7. Data General	☐	☐

What is the total number of Servers/Clients installed/planned: (USE NUMBERS ONLY)

E-AT THIS LOCATION	#	F-% with Internet Access
1. Servers		%
2. Clients		%

G-ENTIRE ORGANIZATION	#	H-% with Internet Access
1. Servers		%
2. Clients		%

Which of the following Servers/Clients do you have installed/planned: (CHECK ALL THAT APPLY)

	At this location:		Entire organization:	
	I. Servers	J. Clients	K. Servers	L. Clients
01. Power PC	☐	☐	☐	☐
02. Power Mac	☐	☐	☐	☐
03. Mac Other	☐	☐	☐	☐
04. Multi Processor Servers	☐	☐	☐	☐
05. P6	☐	☐	☐	☐
06. Pentium Pro	☐	☐	☐	☐
07. Pentium	☐	☐	☐	☐
08. 486	☐	☐	☐	☐
09. 386	☐	☐	☐	☐
10. 286	☐	☐	☐	☐
11. Risc	☐	☐	☐	☐
12. Other	☐	☐	☐	☐

11 What is the estimated value of networking equipment and services that you help specify, recommend or approve annually? (check one only)

01. ☐ $100 million or more
02. ☐ $50 million - $99.9 million
03. ☐ $25 million - $49.9 million
04. ☐ $20 million - $24.9 million
05. ☐ $10 million - $19.9 million
06. ☐ $5 million - $9.9 million
07. ☐ $1 million - $4.9 million
08. ☐ $500,000 - $999,999
09. ☐ $250,000 - $499,999
10. ☐ $249,999 or less
11. ☐ None of the above

12 Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ $10 billion or more
2. ☐ $1 billion to $9.9 billion
3. ☐ $500 million to $999.9 million
4. ☐ $100 million to $499.9 million
5. ☐ $50 million to $99.9 million
6. ☐ $10 million to $49.9 million
7. ☐ $5 million to $9.9 million
8. ☐ $4.9 million or less
9. ☐ None of the above

13 Estimated number of employees at this location/in entire organization:

At this location:
1. ☐ Over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ 499 or less

Entire organization:
1. ☐ Over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ 499 or less

1. FOLD HERE & MAIL TODAY

3. PLEASE TAPE HERE

2. FOLD HERE & MAIL TODAY

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO 1752 NORTHBROOK IL

POSTAGE WILL BE PAID BY ADDRESSEE

NetworkWorld
THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

PO BOX 3091
NORTHBROOK IL 60065-9928

Briefs

Lotus Development Corp. *is shipping Lotus Components Starter Pack, a set of software applets for* **Notes.** *It includes six components — Chart, Comment, Draw/Diagram, File Viewer, Project Scheduler and Spreadsheet — and the Lotus Component Template Builder to customize the components. The company also announced plans to deliver a new release of Components for interactive Internet applications in 1997. The starter pack is available free to all Notes Maintenance customers of the Lotus Passport volume license program.*

Lotus: (617) 577-8500.

BENEFITS OF COMPONENTS

- Can select task-specific applets without leaving Notes desktop.
- Can access documents within them that may then be easily opened in Notes.
- Can extend them using LotusScript or Visual Basic.

Precept Software, Inc. *in Palo Alto, Calif., next month will ship a 32-bit version of its* **IP/TV video-multicasting application** *that is optimized for Windows NT. IP/TV 1.1, which runs on Windows NT 3.51 and 4.0, also adds a feature to its Slidecast server software that lets customers see alternating views of the person giving a presentation and the person's PC-based presentation materials, accompanied by an audiostream. IP/TV 1.1 is priced at $244 for the IP/TV Viewer (client) in volumes of 100 or more, and $1,499 for IP/TV Server.*

Precept: (415) 845-5200.

DigitalFacades, Inc. *in Santa Monica, Calif., is shipping Xpound, software that lets users participate in* **threaded Web-based discussions.** *Xpound lets participants sort postings according to preferences, such as date, subject, author or traffic. Three Unix versions of Xpound will be offered, ranging in price from $149 to $2,995 per server.*

DigitalFacades: (310) 581-4100.

Simba's ODBC middleware creates low-cost database access path

By John Cox
Vancouver

A new middleware product lets companies create an easy-to-install pathway from desktop applications to popular databases that support the Open Database Connectivity (ODBC) interface.

Simba Technologies, Inc.'s SimbaExpress 1.3 software consists of a lightweight client that runs atop any Microsoft Corp. operating system, as well as a set of centrally managed server-based tools and programs that run on Windows NT Server.

The software is an alternative to complex — and often expensive — communications software from database and gateway vendors.

But the software's simplicity carries a price in terms of functionality and performance, cautioned Betsy Burton, research director at Gartner Group, Inc. in Stamford, Conn. Communications software from database vendors, such as Oracle Corp.'s Oracle SQLNet, is designed to exploit the specific features of the vendor's database and often includes encryption, data compression and other functionality.

"If you want an easy, cheap way to get at data, then [SimbaExpress] is the way to do it," Burton said. "What users give up is flexibility and richness [of features]."

That may not be the case, however, with ODBC drivers for databases from Oracle, Microsoft Corp. and Sybase, Inc. that are included with SimbaExpress.

"These live on the server, and the thin [Simba] client takes on their characteristics and 'sees' the respective server's transactional semantics and so on," said Kirk Harrington, Simba's vice president of advanced products.

Intersolv, Inc. of Rockville, Md., and Visigenic Software, Inc. of San Mateo, Calif., also offer ODBC data access products with a server-based architecture, Burton said.

Administrators set up the Simba server using the Simba Services program to list target databases and assign user privileges, Harrington said.

Installing the client requires no more than a double mouse-click, giving end users a view of the databases they are authorized to access.

Desktop query or development tools simply make an ODBC call, which is handled by the Simba client and server programs and passed to the appropriate ODBC driver for the target database. The driver translates ODBC into the target database's native language.

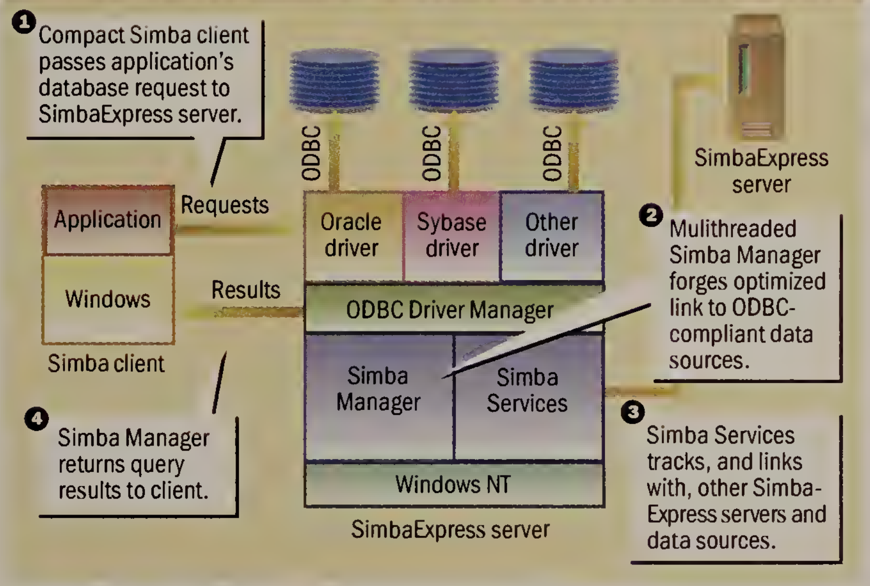
To optimize performance, Simba's engineers built into SimbaExpress several features that reduce the amount of data moving across the network, Harrington said.

MIS groups can run multiple SimbaExpress servers to spread the query load, support higher numbers of end users and provide a backup server.

SimbaExpress 1.3, available now, is priced starting at $995 for four end users.

©Simba: (800) 746-2296.

SimbaExpress: Server-based access to ODBC data


❶ Compact Simba client passes application's database request to SimbaExpress server.
Application
Windows
Simba client
Requests
Results
ODBC
ODBC
ODBC
Oracle driver
Sybase driver
Other driver
ODBC Driver Manager
Simba Manager
Simba Services
Windows NT
SimbaExpress server
SimbaExpress server
❷ Mulithreaded Simba Manager forges optimized link to ODBC-compliant data sources.
❸ Simba Services tracks, and links with, other SimbaExpress servers and data sources.
❹ Simba Manager returns query results to client.

Read more about ODBC middleware products on Network World Fusion (http://www.nwfusion.com). Select News+.

Diamond Head hooks imaging suite to Web

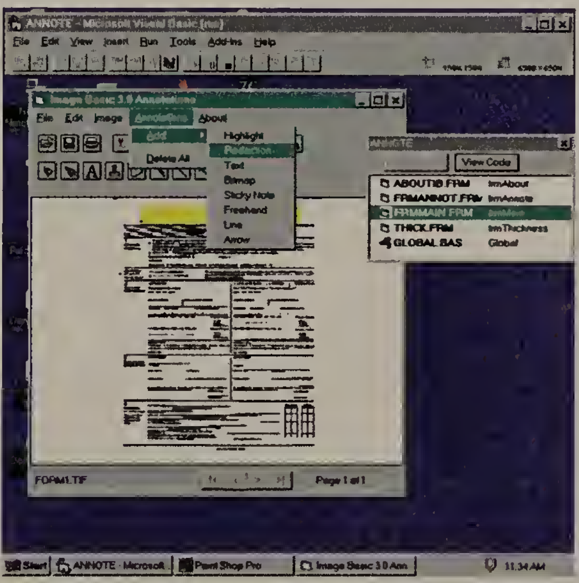
By Barb Cole
Richardson, Texas

Diamond Head Software, Inc. this week will announce a version of its imaging and workflow components suite that is accessible through Web browsers via support for Microsoft Corp.'s ActiveX object component technology.

The company's ImageBasic package now can also run on a wider range of operating system platforms and works with more development tools.

"Moving to ActiveX is a healthy evolution because it allows the components to run in browsers and also to support 16- or 32-bit versions of Windows," said Bruce Silver, president of Bruce Silver Associates, a consulting and research firm in Weston, Mass.

ImageBasic 3.0 is a collection of software components that developers knit together using a tool to form imaging and workflow applications. The software includes scanning, optical character recognition and workflow pieces as well as an image annotation component (see screenshot).



ImageBasic 3.0 *lets customers annotate images and store them either as part of the image or in a separate database.*

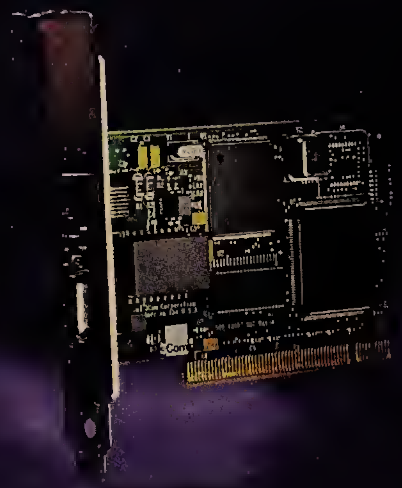
The new edition lets developers compile applications in Windows 3.X, Windows 95 or Windows NT without code changes. Although ImageBasic previously worked only with Visual Basic, it now supports Powersoft Corp.'s PowerBuilder 5.0 and Borland International, Inc.'s Delphi.

The company has also added version control features that make it easier to determine which components are running on a network, according to Bill Burke, president of Diamond Head.

Silver said that although Diamond Head's revised product looks good, the imaging and workflow component market has been "stuck in first gear" due to the lack of back-end server components from industry leaders such as FileNet Corp. and Wang Laboratories, Inc.

ImageBasic 3.0 will ship next week. The core development environment — which consists of display, annotation, and file and print services — costs $1,000. Pricing for the more than 20 additional components is not yet available.

©Diamond Head: (214) 479-9205.



WORKGROUP SOLUTIONS REMOTE ACCESS SOLUTIONS STACKABLE SOLUTIONS NETWORK MANAGEMENT SWITCHING SOLUTIONS ATM SOLUTIONS SERVICE AND SUPPORT FAST ETHERNET SOLUTIONS BUILDING/CAMPUS SOLUTIONS STACKABLE SOL

3Com's PCI Token Ring
is fast, reliable, and highly
Flashy, it ain't.

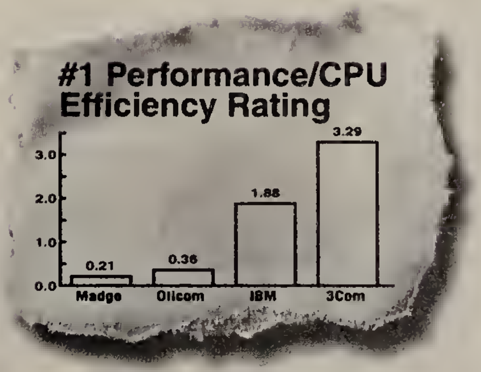
INTERNET ACCESS SOLUTIONS WAN BACKBONE SOLUTIONS TOKEN RING SOLUTIONS IBM/SNA SOLUTIONS SMALL BUSIN

© 1996. (408) 764-5000. 3Com, TokenLink, Velocity and Networks That Go the Distance are trademarks of 3Com Corp. All other names are property of their respective companies. For the full study, visit LANQuest Lab's web site at http://www.lanquest.com. To learn more, visit our

ONS SWITCHING SOLUTIONS ISDN SOLUTIONS ETHERNET SOLUTIONS REMOTE ACCESS SOLUTIONS IBM/SNA SOLUTION

adapter

acclaimed.



You might say that making bells and whistles isn't our thing. On the other hand, building fast and efficient products is. And that's what people have been saying about our Token Ring network interface cards.

They've said that our PCI Token Ring NIC has low CPU utilization, high throughput speed and that it optimizes performance in multi-tasking environments like Windows® 95 and Windows NT™. So, where's the proof? Well, in a 1996 LANQuest Labs™ study, our new TokenLink® Velocity™ PCI adapter got the best performance/efficiency rating of any PCI NIC tested. And who can argue with that?

So, come to 3Com® for your Token Ring adapters. Not only are we networking leaders, we're also committed to giving Token Ring customers innovative products to keep up with the demands of their network. Both our PCI NICs and our 100% IBM® compatible 16/4 ISA NICs come with a lifetime warranty and are available for you to evaluate today with a special introductory offer. Just don't expect it to come with a special 12-piece knife set. For more information, call **1-800-NET-3Com, Option 4.**

3Com®

OKEN RING SOLUTIONS FDDI SOLUTIONS FAST ETHERNET SOLUTIONS NETWORK MANAGEMENT ATM SOLUTIONS INTERNET ACCESS SOLUTIONS

SOLUTIONS ETHERNET SOLUTIONS HOME OFFICE SOLUTIONS

NETWORKS THAT GO THE DISTANCE

World Wide Web site at http://www.3com.com

Circle Reader Service **#55**

SHARED LOGIC

Doing justice to Web security

As you probably know, hackers broke into the Department of Justice's Web server on Aug. 16, replacing "Department of Justice" with "Department of Injustice," the D.O.J. seal with a swastika, and generally making a mess of the home page.

The HTML damage was quickly repaired, but the public relations effect has not been mitigated.

The Justice Department explained that the compromised server was not connected to any network of importance and that no sensitive information was accessed. The Web server at www.usdoj.gov contains press releases, copies of speeches and other information that is freely available to the public. Still, the embarrassment caused by the incident could be avoided in the future.

What network security vendors and administrators need to keep in mind is that while a Web server may be the most accessible machine in an organization with the least sensitive data, it still deserves serious protection, if only for the sake of public relations. In other words, while your internal network may be completely secure, your public security image may be formed by the ease with which your home page gets hacked.

As vendors vie for market share in the Internet security arena, it seems that most attention is being focused on the construction of firewalls for the protection of the internal corporate network. Microsoft Corp.'s new Internet Proxy Server, code-named Catapult, is 100% focused on securing the local network and cannot, as I understand it, be configured to intercept incoming traffic from the public Internet. Microsoft depends on the Windows NT-based Internet Information Server security mechanisms to handle incoming traffic.

Catapult is receiving lots of good comments from beta testers and is due out by year-end. It is what is known as an application-level gateway because it examines application services, including File Transfer Protocol and Gopher. It resides on the local Internet server and is responsible for intercepting and forwarding valid requests from a client Web browser to an external subnetwork. The power of Catapult and other tools in its class such as Netscape Communications Corp.'s Proxy Server lies in their ability to completely isolate the end user from the Internet in a way that is transparent to the end user.

Marc Myers

From the user's point of view, accessing Web sites by typing in URLs occurs in the usual way. But in fact, the user is only accessing the proxy server, and Catapult then forwards the requests over an entirely separate network interface card to the Internet.

This is useful and well-conceived technology, but Catapult should also be made capable of sitting between the Internet and the local Web server. That way, hackers could never directly access the Web server.

Certainly, the Justice Department has now taken measures to prevent future hacking. But if the agency has responded like many compromised organizations, it is now only protected against intrusions of the type that occurred the week before last, along with perhaps other common break-in techniques.

The real question is: How do you protect networks against new, undocumented hacking techniques? Perhaps the answer lies in the configuration of application-level gateways like Catapult to contain more than just deterministic intelligence, but also the ability to learn from experience.

Myers is CEO of Client/Server Connection, Ltd., a New York-based software development company. He can be reached via the Internet at mmyers@cscl.com.

THE INTRANET EVENT

where the Internet means business

Did you ever feel like you were on a speeding roller coaster that had no brakes? If you are a corporate Webmaster, IS professional, network designer, or part of an Internet/intranet deployment team, you probably know the feeling well. The Internet is changing so fast that even the most conscientious professional is challenged to keep pace with the latest technologies, products, and practices.

Now there's one place Internet business professionals can go to see and learn it all. Interop DotCom, the only event dedicated to providing all the product and technology information needed to effectively deploy Internets and intranets in business.

Interop DotCom is produced by SOFTBANK Expos, the same folks who bring you NetWorld+Interop, the industry's leading conference and exhibition on networking. Interop DotCom will coincide with NetWorld+Interop in Atlanta, September 16-20.

Call 800-488-2883 for your FREE pass or stop by our Web site at www.interop.com

Interop DotCom Atlanta 96

CONFERENCE:
September 16-18, 1996

EXHIBITION:
September 18-20, 1996

Georgia World Congress Center
Atlanta, Georgia

Intranets & the 'Net

Covering: Internet Technologies and Services
for Collaboration and Electronic Commerce

Briefs

■ **Digital Equipment Corp.** *recently announced that the second version of its Web conferencing software,* **AltaVista Forum,** *will ship at the end of this month. Pricing is $495 for 25 users and $3,995 for unlimited users.*

The product runs on Unix, Windows NT and Sun Solaris systems with Microsoft Corp., Netscape Communications Corp., Process Software Corp., Apache Group or National Center for Supercomputing Applications HTTP servers.

■ **VeriSign, Inc.** *has published its Certification Practice Statement, a document outlining responsibilities for issuers and holders of the three classes of VeriSign Digital ID certificates. The document, which sets a $100,000 liability cap for damages involved with* **digital certificate** *use, is intended to be a "living document that can be updated in response to new service offerings and merging regulatory requirements," according to VeriSign attorney Michael Baum.*

■ **Fisher Technology Group** *has opened the ProcureNet InternetMall, an* **electronic commerce Web site** *for the maintenance, repair, operations and office supplies industry.*

■ **Northern Telecom, Inc.** *has released Entrust Version 2.1, a new version of its electronic commerce* **security tool kit.** *It adds support for the Digital Signature Standard, the U.S. government-required digital signature technology. Version 2.1 also supports the RSA Data Security, Inc. digital signature.*

Nortel: (214) 684-8721.

■ *Los Gatos, Calif.-based* **BulletProof, Inc.** *last week began shipping JDesignerPro 1.0, an application development tool for* **creating customized client/server** *database systems in the Java language using Java Database Connectivity or Open Database Connectivity.*

The software is available for free at www.bulletproof.com/JDesignerPro/.

Clothing outfit goes worldwide on the Web

By Ellen Messmer

Columbus, Ohio

As part of an effort to expand worldwide, women's clothing retailer Express, with more than 740 stores nationwide, this month opened up an electronic storefront on the World-Wide Web.

Express, a division of The Limited, Inc., is taking credit card orders in encrypted form over the 'Net, and is already seeing sales for its line of women's sportswear coming in from places as far afield as Brazil, Canada and the U.K.

Express, largely metropolitan-based, also hopes its Web merchandising site will attract customers living in remote rural areas of the country, said Les Duncan, Express vice president and chief information officer.

ON LINE

Shop around for more info about Web merchandising and electronic storefronts. Select News+.

Network World Fusion
http://www.nwfusion.com

But in its first Web electronic store, Express has organized its backroom shipping and inventory management specifically to get set for sales to customers outside the U.S.

"To simplify shipping costs, we've set a flat $25 shipment fee for packages outside the U.S.," Duncan said.

Express has received counsel on taxes and duties on foreign goods from its sister company, Victoria's Secret, another division of The Limited, which handles international sales through its catalogue.

The legalities of paying state sales tax for merchandise sold online is still being argued by many state tax authorities and retailers. Express will pay state tax on goods it sells online based on the long-established mail-order tax model, Duncan said.

Express has never had a mail-order catalog, making its Web venture all the more remarkable.

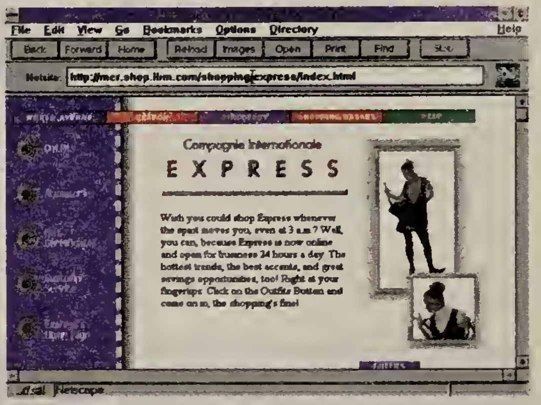
Only about 50% of the world has Internet access, Duncan said, so sales orders are not anticipated from lesser developed parts of the world where networked PCs are still a rarity.

To promote its Web merchant site, Express is advertising on Web search engines Lycos, Yahoo and Excite.

Duncan said Express considered building its own Web commerce server but decided it was important to be part of an electronic mall where the Express might benefit from "cross-traffic" as shoppers visit several electronic stores as they do in shopping malls today.

Along with Robert Waxman Camera, Express is the anchor tenant at IBM's new Internet mega-mall, World Avenue, a commerce server housed in IBM headquarters in Armonk, N.Y.

Express paid IBM a $30,000 onetime fee for Web start-up, and expects to pay a $2,500 monthly maintenance fee and 5% commission on sales. "We wanted to be among the first at World Avenue so we could help shape the direction of the mall," Duncan said.



Wish you could shop Express whenever the spirit moves you, even at 3 a.m.? Well, you can, because Express is now online and open for business 24 hours a day. The hottest trends, the best accents, and great savings opportunities, too! Right at your fingertips. Click on the Outfits Button and come on in, the shopping's fine!

Express *sells to an international clientele on the Web.*

Customers make their purchases using Web browsers, and IBM forwards the orders in encrypted form to an Express mail server here once an hour.

The Express employee acting as the Internet store manager obtains credit card authorization from MasterCard and Visa, then sends an order acknowledgement and shipping notice via E-mail to the customer.

"The order is automatically read into a back-end processing system, and fields are populated off the order so we don't have to retype the information," Duncan said.

Express has set up a special miniwarehouse to hold the inventory of clothing sold at World Avenue to speed delivery and narrow the chance a customer will have to be E-mailed about back orders. ■

Nets clogged with news?

By Carol Sliwa

Mountain View, Calif.

With the release of its new Navigator 3.0 Web client, Netscape Communications Corp. last week announced a new customized news service called Inbox Direct.

As Netscape's senior vice president of marketing, Mike Homer, described it, "Now users can easily get their favorite content delivered directly to their [Internet mail] inbox — much like they get their favorite newspapers delivered to their doorstep."

Users just fill out a form, indicate their preferences and watch for the HTML pages to arrive via electronic mail.

But some HTML pages are larger than others, and they can pile up just like newspapers by the door.

"I'd like to have the ability to be informed when important [Web] pages change," said Daniel Blum, a principal with the Rapport Communication consultancy. "On the negative side, it could create another management problem for administrators as users begin to fill their mailboxes with Web pages."

The size of a Web page with graphics can range from 20K to 100K bytes, analysts said.

But Netscape product manager Edith Gong said she expects content providers typically will send only the HTML text page, not the massive graphics that go along with it. Graphics, video and sound will be downloaded at runtime as the message is opened, Gong said.

And the war goes on...

Content providers deliver Web pages directly to your Netscape Navigator 3.0 E-mail inbox. Microsoft's Internet Explorer 3.0 provides free subscriptions to certain Web sites. These are a few of the more popular examples:

Netscape

IDG publications
NewsPage from Individual
The New York Times

Microsoft

ESPNET SportsZone
InvestorsEdge.com
The Wall Street Journal Interactive Edition

There could be a problem, however, if 200 employees at the same company decide they wanted the multimedia content delivered at 8 a.m.

"By enabling multimedia content, you certainly increase the likelihood that there's going to be large amounts of data clogging the network," said Tim Sloane, director of messaging applications research with Boston-based Aberdeen Group, Inc.

Netscape's Gong said network administrators can control that through proxy servers. And if the huge files are arriving as messages, administrators might be able to configure their mail servers to help control the situation if they support traffic management based on message content size, she said.

Will all this matter much in the long run?

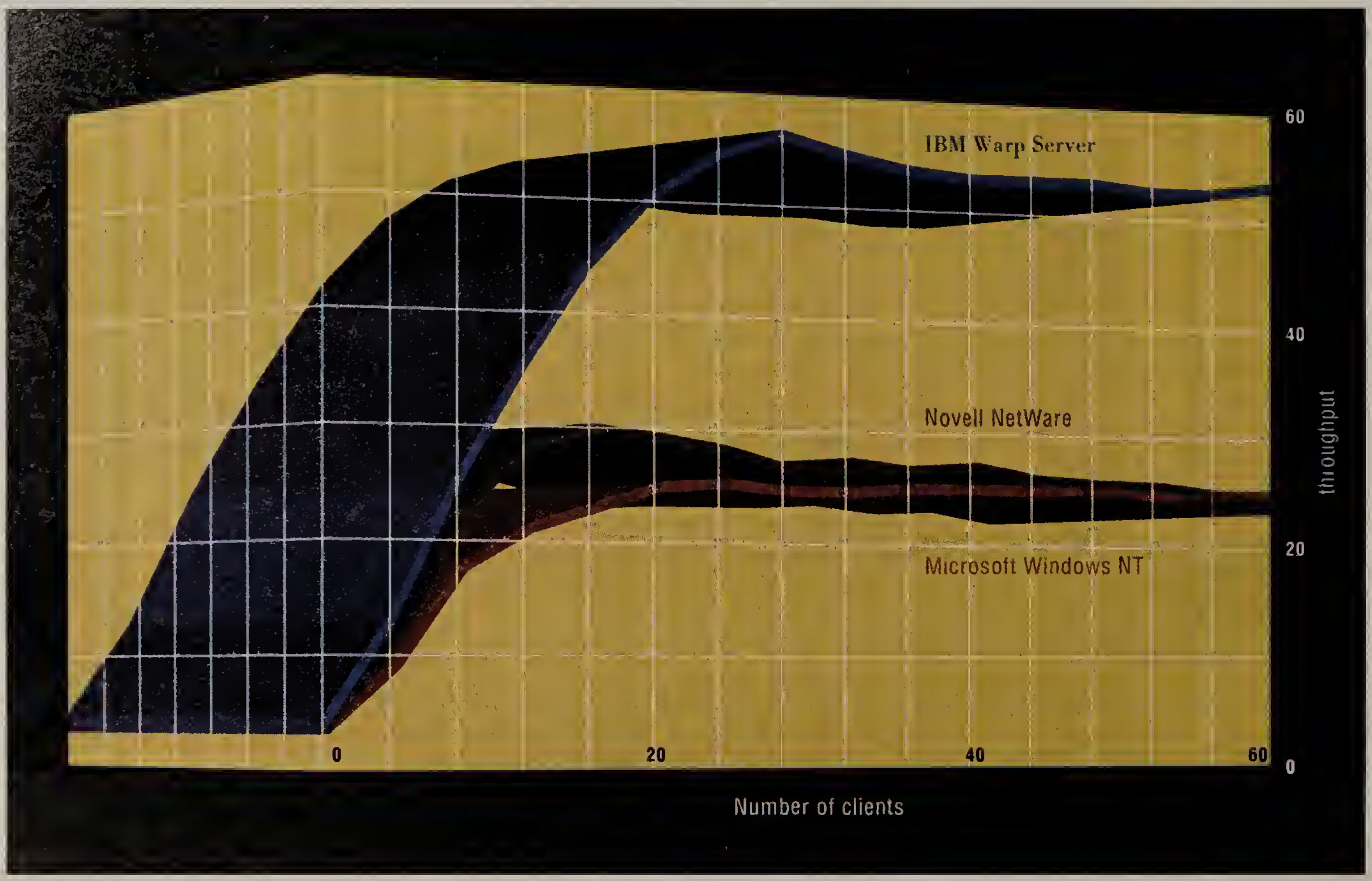
Booz, Allen & Hamilton, Inc., one of Netscape's larger corporate customers, is not even sure it will want to use the new Inbox Direct service.

"I come to the office to work, not read the newspaper," said Aron Dutta, a principal with the management and technology firm's banking and capital markets practice.

On the other hand, Dutta said he would love to be able to use the MailCaster tool that Netscape is giving to content providers to help him deliver internal information to his company's employees.

☎Netscape: (415) 937-2555.

What you do most, we do best.

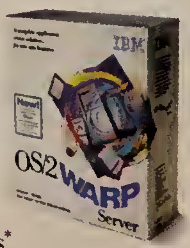


FILE AND PRINT SERVER PERFORMANCE

Network

We're very happy to report that OS/2® Warp Server has now been shown to do some tasks up to 26% faster than Windows NT™ or Novell NetWare®.

We're even happier to report that these are the tasks your network does most often – file and print serving. So this is a speed boost that everyone on the network will notice. (With our drag-and-drop GUI, the network administrator will see other tasks move faster as well, but that's a whole other story.)



These are the results of an independent test by Ziff-Davis, comparing the relative performance of the major network OS's.* And it's all there in black and white, for your reading pleasure and enjoyment.

Visit our Web site at www.software.ibm.com for your copy of the lab test. While you're at it, pick up our Cost of Ownership White Paper.

Because now there's proof that OS/2 Warp Server saves more than time when compared to other network OS's – it actually saves money.

Or use our automated fax-back service. Just call 1 800 IBM-4FAX and enter 5729 for the lab test and 5728 for the White Paper.

IBM®

Solutions for a small planet™

*Reprinted from PC Week, April 1, 1996 © 1996 Ziff-Davis Publishing Company. IBM and OS/2 are registered trademarks and the OS/2 logo and Solutions for a small planet are trademarks of International Business Machines Corporation. All other company and/or product names are trademarks or registered trademarks of their respective companies. © 1996 IBM Corp. All rights reserved.

Technology Update

Keeping Up with Network Technologies and Standards

NETWORK HELP DESK

Network World tracks down answers to your questions. Please submit them to Chris Nerney via phone at (800) 622-1108, Ext. 451, the Internet at cnerney@nww.com or fax at (508) 820-1103.

We are running a Novell, Inc. NetWare 3.12 server. We have two hard drives, with what was a combination of 16-volume segments and volumes between them. At this stage, because of the server limitation of eight segments/volumes per disk, we cannot add another volume or volume segment.

However, we needed to add another volume segment to our main application volume, as we had approximately 800M bytes of unused disk space that we could not access. So we moved some files and directories and deleted a volume that was no longer necessary. To our surprise, when we went to create another volume segment, none of the previously unavailable disk space became available.

Do we need to bring the server down and back up before it will recognize this disk space?

Via the Internet

Bringing the server down and back up certainly should help resolve the problem, says Ron Nutter, a Master Certified Novell Engineer and Groupware CNE in the Lexington, Ky., area. Although the server should recognize the available disk space immediately, it might take a while, he says.

Since it is not doing so in your case, you might want to apply the latest NetWare 3.12 patch kit (312PT8.EXE). This will also help avoid any other potential problems. And while you're at it, make sure you have the latest available disk drivers for your server's hard drive controller, Nutter suggests.

From what you describe, you potentially have a more serious problem with which you need to contend, Nutter says. It sounds like the server has grown by leaps and bounds. You might want to spend the time to plan out the consolidation of the volumes and segments to bring the configuration to the server's minimum. You're spanning the volumes between drives, a practice that Novell actively discourages because of the danger of losing an entire volume due to the failure of just one drive, Nutter says.

Calling your colleagues over ATM

Compression, silence suppression and other advanced techniques increase the feasibility of adding voice to the wide-area ATM networks already installed for data.

By Peter Thornycroft

Running voice and other isochronous traffic over a single network fabric, particularly ATM, has become a central issue for both network managers and service providers looking to drive down unit costs. But this is a complex proposition.

In enterprise networks, voice typically originates in PBXs as 64K bit/sec synchronous datastreams using a technique commonly known as pulse code modulation (PCM). ATM switches must deliver these PCM streams unchanged to a destination PBX while offering advantages over simple leased-line alternatives.

At present, however, the only way to interconnect PBXs using ATM equipment is with constant bit rate (CBR) services. Because CBR services emulate a circuit, they are essentially equivalent to leased lines. This is not a terribly efficient approach to running voice over ATM. At the same time, the ATM Forum is working on standards for multiplexing ATM cells over a more bandwidth-efficient class of service, such as available or variable bit rate, and for applying advanced techniques that save bandwidth and increase efficiency.

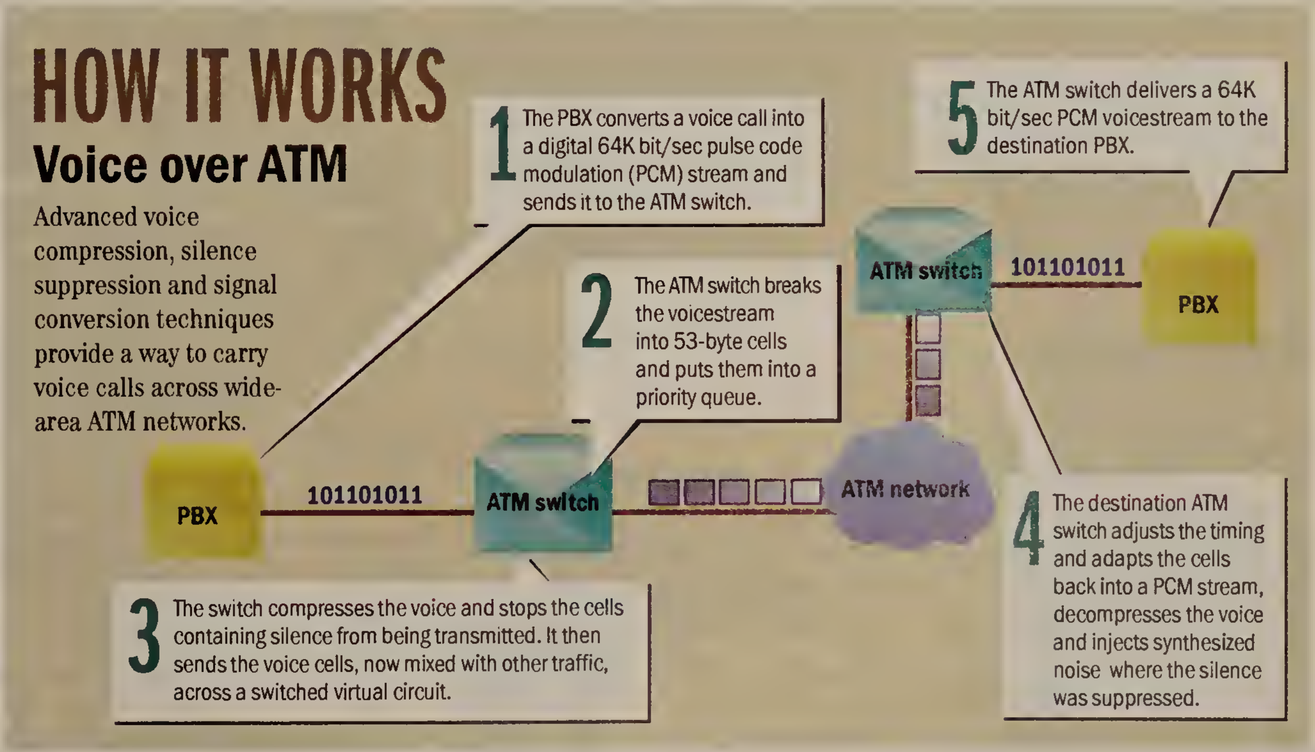
In a more sophisticated scenario, the ATM switch segments the synchronous voice signal into 53-byte ATM cells that have their own headers. The cells then enter the network, where they are interleaved with cells from other sources carrying different traffic types, and are delivered to the destination. At the destination, an ATM switch puts the cells back into a synchronous stream.

Though this sounds simple, it's not. Delays, such as those caused by adaptation to and from cells, introduced along the path can ruin voice transmissions. With a 50-msec delay, echo is encounterd in a roundtrip talker-to-listener-to-talker conversation. Bump that up to a 250-msec delay between speaking and hearing the response, and the conversation is disjointed. (Satellite voice connections, during which the roundtrip delay is about 600 msec, encounter the same effect.)

In order to minimize the impact of delay, the network must guarantee delivery of the voice cells within certain jitter intervals, allowing a switch's retiming buffer to be accurately sized to the minimum required. A number of techniques help toward this end.

Squeezing the conversation

Available today are a number of standard voice compression algorithms that provide toll-quality connections at different rates. The most popular include G.726 adaptive differential PCM (ADPCM) at 48K, 32K, 24K and 16K bit/sec, G.728 LD-CELP at 16K bit/sec and G.729 CS-ACELP at 8K bit/sec. These algorithms, and others, can be implemented in ATM nets by providing an encoder at the source and a decoder at the destination.



HOW IT WORKS

Voice over ATM

Advanced voice compression, silence suppression and signal conversion techniques provide a way to carry voice calls across wide-area ATM networks.

1 The PBX converts a voice call into a digital 64K bit/sec pulse code modulation (PCM) stream and sends it to the ATM switch.

2 The ATM switch breaks the voicestream into 53-byte cells and puts them into a priority queue.

3 The switch compresses the voice and stops the cells containing silence from being transmitted. It then sends the voice cells, now mixed with other traffic, across a switched virtual circuit.

4 The destination ATM switch adjusts the timing and adapts the cells back into a PCM stream, decompresses the voice and injects synthesized noise where the silence was suppressed.

5 The ATM switch delivers a 64K bit/sec PCM voicestream to the destination PBX.

Silence suppression also helps. Because the voicestream is segmented into cells, it's possible to examine the contents of each cell as it is generated. If the cell does not contain any speech — about 50% of every conversation is silence as one party listens while the other talks — it can be suppressed.

At the destination, the missing cells are identified and their time interval is replaced by a synthesized background noise signal. Combining compression and silence suppression can have impressive results.

For example, using ADPCM at 32K bit/sec and voice activity detection silence suppression, each voice connection over the WAN requires a quarter of the bandwidth it would need as a PCM signal. In addition, using the same trunk bandwidth for data allows for one enterprise network rather than two, providing overall bandwidth savings in excess of 50%.

Mixed signals

At a basic level, PBXs can be interconnected over an ATM WAN using permanent virtual circuits, or dedicated links. The PBXs use ATM signaling to seize and release the lines and for dialing information. The PBXs must be programmed with the destination of each connection so they can route each call correctly. At the next level, an ATM switch intercepts voice calls from the PBX and switches them to the correct destinations. This approach provides a more efficient use of bandwidth because it doesn't rely on traffic following predefined patterns.

To determine the correct destination, the ATM network must interpret the signaling and dialing streams from the PBX. This is done using a Common Channel Signaling (CCS) protocol. In a CCS-switched environment, the network appears as a tandem PBX. It accepts calls from attached PBXs, identifies and routes them to their destinations and then passes through all the feature information transparently. Though phoning home using ATM won't happen anytime soon, putting voice back on corporate networks for free is now possible using an advanced implementation strategy that takes into consideration different delays, bandwidth utilization and signaling conversion.

ONLINE

Get more information about voice over ATM on Network World Fusion. Click on NetRef, Technology Resources then Broadband networks.

Network World Fusion
http://www.nwfusion.com

This will undoubtedly put a smile on the faces of network managers hoping to reduce costs and increase the efficiency of their wide-area ATM backbones.

Thornycroft is technical marketing director for the Wide Area Network Business Unit of Cisco Systems, Inc. in San Jose, Calif. He can be reached at pthornyc@cisco.com.

EDITORIAL INSIGHTS

Novell serves up an ace

File this one under "Giving credit where it's due."

In February, I urged Novell to pounce on the intranet opportunity to shore up its market share and, more importantly, to help all the customers out there with NetWare servers.

In the past, I've criticized Novell pretty harshly for failing to set a clear course. But CEO Robert Frankenberg seems to have pulled off the difficult job of turning the aircraft carrier Novell in a new direction. He's transforming the company into a powerful force in the intranet market — one that doesn't get all the Page 1 ink splashed on the browser battlers Microsoft and Netscape.

Hey, an intranet is more than Web browsers and servers. Intranets need management and administration tools, support for an array of development options, applications, links to legacy systems and more. Novell is pulling all those things together in a way that makes it easy for resellers to bring the thousands of NetWare shops into the intranet era. Novell's latest step in that direction was the introduction of IntranetWare, which packages NetWare 4.11, the very robust NetWare Web Server and other tools.

Why am I high on Novell's intranet strategy? For one thing, it centers on NetWare, which is nearly ubiquitous and has been fine-tuned over the years for an intranet server-like role (compared to a general-purpose application platform). What's more, NetWare has strong security and the best directory in the industry — a must for managing documents, users and servers.

Novell has also taken a decidedly nonproprietary stance, embracing standards and key technologies such as the Lightweight Directory Access Protocol, Perl, Java, RSA encryption and Open Market electronic commerce tools. On top of all this infrastructure, Novell layers its ManageWise management system and the increasingly powerful GroupWise groupware.

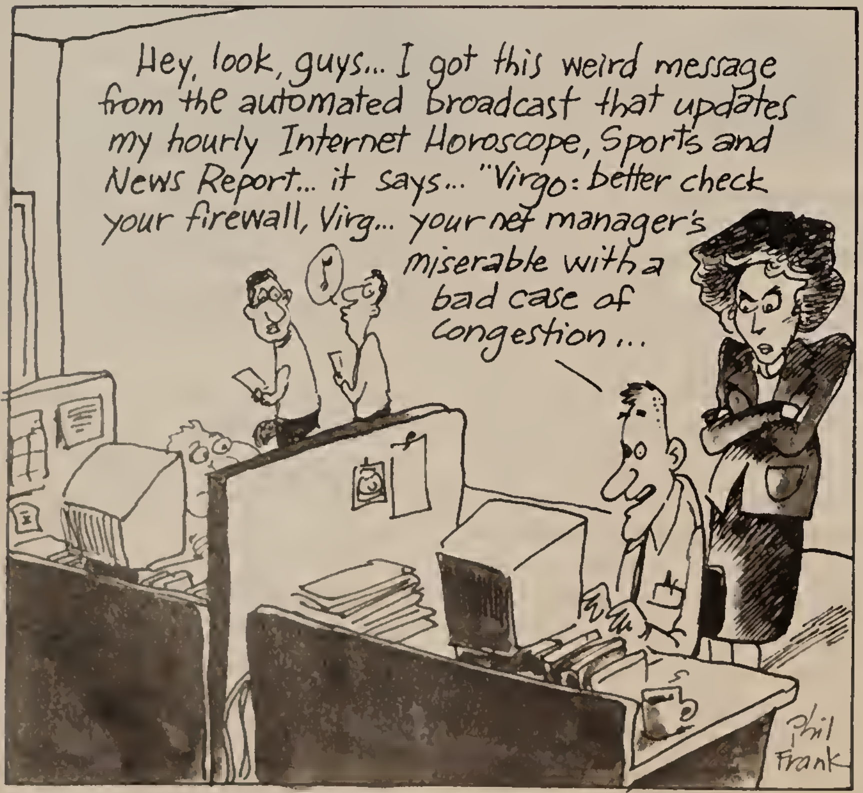
Over the past couple years, Novell has taken its lumps for getting off-track and confusing customers. But with this new intranet focus, the company has again found the mark (particularly if it keeps the as-yet-unspecified price of IntranetWare low).

While the rest of the world gazes raptly on the frenzied fight between Microsoft and Netscape, smart customers will turn their attention to another supplier — Novell — who just might make their jobs a whole lot easier.

John Gallant, editor in chief jgallant@nww.com

Teletoons

By Phil Frank and Joe Troise
baba@sfgate.com


Hey, look, guys... I got this weird message from the automated broadcast that updates my hourly Internet Horoscope, Sports and News Report... it says... "Virgo: better check your firewall, Virg... your net manager's miserable with a bad case of congestion...
Phil Frank

SPEAKING THE LANGUAGE

GroupWise 5 has the right stuff to redefine the groupware market

Linda Musthaler

When you think of groupware, what comes to mind? Probably Lotus Notes, right? Notes seems to have become the default definition of groupware, simply because Lotus was early to market with a product that helped define that category of applications.

Well, Novell, Inc. is about to give a new definition to groupware. GroupWise 5 is just around the corner, and it combines the common-sense productivity tools that people really need with honest-to-goodness ease of use.

GroupWise 5 is currently in the final stages of beta testing and is expected to ship by the end of summer. But you wouldn't know it, judging by how low-key Novell has been about this product. A limited number of sites were involved in early beta testing. Only recently has Novell expanded its test bed to thousands of user organizations and started talking up the product to its major accounts.

Contrast that to some Microsoft Corp. products that have tens or hundreds of thousands of beta-test sites, and everyone including your uncle knows the product before the ship date. But that's the difference between a company with good technology and one with good marketing.

GroupWise is ideal for the remote or occasionally connected user. Remote mailbox synchronization is done automatically upon start-up of the remote client.

With beta copies being hard to come by, you may not be aware of what comes in the GroupWise 5 package. The heart of the product is still its messaging engine, with group calendaring and scheduling capabilities. In addition, Novell has stuffed the box with other productivity enhancers, including significant document management and workflow capabilities, extendable address-book features, and great remote-user support. In Novell's words, GroupWise "expands E-mail with work processing capabilities."

My own company practically runs its business on GroupWise 4.1, and we are most anxious to step up to Version 5. We especially favor the universal in-box, which manages many different types of information. We receive our E-mail text messages in the in-box, but we've also experimented with various integrated telephony services.

For example, Novell's Telephone Access Server (TAS) allows us to access our in-boxes via the telephone. The server reads the text messages, appointments and such as if they were actual voice recordings. What a boon to people who travel and need to check E-mail messages, but don't always have access to a PC and modem. Instead, the traveler can check E-mail from any touch-tone phone.

CallWare from CallWare Technologies, Inc. is an add-on product that integrates voice mail with the GroupWise inbox. Voice mail messages just appear as another data type, and when you click on them, they are read aloud for you. I really like not having to check voice mail and E-mail separately.

Both TAS and CallWare are currently supported by GroupWise 4.1.

We're looking forward to some of the new features GroupWise 5 will provide, such as the integration of Novell's SoftSolutions document management application with the messaging system. When you search for and request documents in a SoftSolutions library, they will be forwarded directly to your in-box.

But you don't even need SoftSolutions for document management capabilities. Novell took the full-text retrieval capabilities from SoftSolutions and applied them to everything in the in-box. Thus, all objects, including those tucked away in folders, are fully searchable by content and not just date or subject. The objects include E-mail, voice mail, faxes, images, appointments, tasks and workflow items. In fact, any application compliant with the Open Document Management API can utilize GroupWise 5's document management services.

Network administrators will appreciate the fact that GroupWise 5 is fully integrated with Novell Directory Services (NDS), reducing the burden of administration. All GroupWise system information and objects are defined in NDS through the NWAdmin utility, so it's not necessary to retrain on new administrative tools.

And lest you think you have to be running NetWare to use GroupWise, think again. GroupWise 5 will run on various server platforms, including NetWare 3.X and 4.X NetWare Loadable Modules, Windows NT, Unix and even OS/2. At least one NetWare 4 server is required to host the NDS-based master directory for GroupWise 5, but otherwise, you can use the platform of your choice.

GroupWise is ideal for the remote or occasionally connected user. Remote mailbox synchronization is done automatically upon start-up of the remote client. What's more, a user has three methods for remote access: remote node, peer-to-peer and browser-based. Like all other vendors, Novell is striving to make its products Internet-friendly, and GroupWise 5 is no exception. With proper authorization and a software add-on called WebAccess, users can access personal and collaborative services through the Internet.

Lotus Notes may have a jump on the groupware market, but GroupWise 5 is the off-the-shelf collaborative application many of us have been waiting for. There's no need for extensive applications development to make this product useful.

If you want to learn more about GroupWise 5, check out the Novell Web site at http://www.novell.com. For an independent point of view, Patricia Seybold Group, Inc. published a review of GroupWise 5 in its May 1996 *Workgroup Computing Review.* You already know my opinion: This is good stuff.

Musthaler is vice president of research for Currid & Co., a Houston-based technology consulting firm. She can be reached at (713) 789-5995 or via the Internet at linda@currid.com.

FREE Product Info

READER SERVICE CARDS

Reader Service Card

NetworkWorld

IT'S EASY. Circle the number on this card which corresponds to the number at the bottom of the advertisement. Mail or FAX to (413) 637-4343 today. Information will be provided to you FREE of charge.

Circle the number below which corresponds to the number at the bottom of the advertisement for more information.

LAN WORLD

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27

DISPLAY ADVERTISING

28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99
100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117
118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135
136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153
154	155	156	157	158	159	160	161	162

MARKETPLACE

163	164	165	166	167	168	169	170	171
172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261
262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279
280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297
298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324

Please check all of the products for which you are interested in receiving FREE information.

COMPUTERS/PERIPHERALS

600 ☐ Backup Devices
601 ☐ Cabling and Cabling Systems
602 ☐ Micros/PCs
603 ☐ Mainframes
604 ☐ Minis
605 ☐ Printers
606 ☐ Storage Devices
607 ☐ Terminals
608 ☐ UPS
609 ☐ Workstations

SOFTWARE

610 ☐ Applications
611 ☐ Client/Server Application Development
612 ☐ Communication/Terminal Emulation
613 ☐ Computer Operating Systems
614 ☐ Database Management/RDBMS
615 ☐ E-Mail
616 ☐ Groupware
617 ☐ LAN Operating Systems
618 ☐ Network Diagramming
619 ☐ Network Management
620 ☐ Security
621 ☐ Suites
622 ☐ Systems Management

INTERNETWORKING

623 ☐ Bridges
624 ☐ Routers
625 ☐ Gateways

LOCAL AREA NETWORKS

626 ☐ ATM Switches
627 ☐ Ethernet Switches
659 ☐ Fax Servers
628 ☐ Hubs/Intelligent Hubs
629 ☐ LAN Servers
630 ☐ Local Area Networks
631 ☐ Network Adapter Boards/NICs
632 ☐ Peer-to-Peer LANs
633 ☐ Print Servers
634 ☐ Remote LAN Access
635 ☐ Remote Access/Communication Servers
660 ☐ Security
636 ☐ SNMP Network Management
661 ☐ Storage
637 ☐ Superservers
638 ☐ Wireless Networks

REMOTE/WIRELESS COMPUTING

639 ☐ Laptops, Notebooks
640 ☐ PCMCIA
641 ☐ Mobile Data Equipment and Services
642 ☐ Wireless Data Equipment and Services

WAN EQUIPMENT AND SERVICES

643 ☐ ATM
644 ☐ CIT (Computer Integrated Telephony)
645 ☐ Diagnostic, Monitoring and Test Equipment
646 ☐ DSU/CSU
647 ☐ E-Mail/On-Line Services
648 ☐ FAX Boards/Modems
649 ☐ Fiber Optics
650 ☐ Frame Relay
651 ☐ ISDN
652 ☐ Modems
653 ☐ PBX
662 ☐ Security
654 ☐ SMDS
655 ☐ T1, T3, Fractional T1 Mux and Services
656 ☐ Videoconferencing/Teleconferencing
657 ☐ WATS/MTS

INTERNET/ELECTRONIC COMMERCE

658 ☐ Internet Access Providers/Services
659 ☐ Firewalls
660 ☐ Web Servers
661 ☐ Internet Software Tools

OTHER

662 ☐ Education and Training
663 ☐ Storage Cabinets/Furniture

ISSUE DATE 8/26/96

CARD MUST BE RECEIVED BY 11/26/96

NAME

TITLE

COMPANY

STREET

CITY/STATE/ZIP

(   )
PHONE

(   )
FAX

E-MAIL ADDRESS

FILL OUT, DETACH AND MAIL

Now it's easy to find valuable information on the latest products and services with *Network World's* Reader Service Card – FREE!

FILL OUT, DETACH AND MAIL

Reader Service Card

NetworkWorld

IT'S EASY. Circle the number on this card which corresponds to the number at the bottom of the advertisement. Mail or FAX to (413) 637-4343 today. Information will be provided to you FREE of charge.

Circle the number below which corresponds to the number at the bottom of the advertisement for more information.

LAN WORLD

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27

DISPLAY ADVERTISING

28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99
100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117
118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135
136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153
154	155	156	157	158	159	160	161	162

MARKETPLACE

163	164	165	166	167	168	169	170	171
172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261
262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279
280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297
298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324

Please check all of the products for which you are interested in receiving FREE information.

COMPUTERS/PERIPHERALS

600 ☐ Backup Devices
601 ☐ Cabling and Cabling Systems
602 ☐ Micros/PCs
603 ☐ Mainframes
604 ☐ Minis
605 ☐ Printers
606 ☐ Storage Devices
607 ☐ Terminals
608 ☐ UPS
609 ☐ Workstations

SOFTWARE

610 ☐ Applications
611 ☐ Client/Server Application Development
612 ☐ Communication/Terminal Emulation
613 ☐ Computer Operating Systems
614 ☐ Database Management/RDBMS
615 ☐ E-Mail
616 ☐ Groupware
617 ☐ LAN Operating Systems
618 ☐ Network Diagramming
619 ☐ Network Management
620 ☐ Security
621 ☐ Suites
622 ☐ Systems Management

INTERNETWORKING

623 ☐ Bridges
624 ☐ Routers
625 ☐ Gateways

LOCAL AREA NETWORKS

626 ☐ ATM Switches
627 ☐ Ethernet Switches
659 ☐ Fax Servers
628 ☐ Hubs/Intelligent Hubs
629 ☐ LAN Servers
630 ☐ Local Area Networks
631 ☐ Network Adapter Boards/NICs
632 ☐ Peer-to-Peer LANs
633 ☐ Print Servers
634 ☐ Remote LAN Access
635 ☐ Remote Access/Communication Servers
660 ☐ Security
636 ☐ SNMP Network Management
661 ☐ Storage
637 ☐ Superservers
638 ☐ Wireless Networks

REMOTE/WIRELESS COMPUTING

639 ☐ Laptops, Notebooks
640 ☐ PCMCIA
641 ☐ Mobile Data Equipment and Services
642 ☐ Wireless Data Equipment and Services

WAN EQUIPMENT AND SERVICES

643 ☐ ATM
644 ☐ CIT (Computer Integrated Telephony)
645 ☐ Diagnostic, Monitoring and Test Equipment
646 ☐ DSU/CSU
647 ☐ E-Mail/On-Line Services
648 ☐ FAX Boards/Modems
649 ☐ Fiber Optics
650 ☐ Frame Relay
651 ☐ ISDN
652 ☐ Modems
653 ☐ PBX
662 ☐ Security
654 ☐ SMDS
655 ☐ T1, T3, Fractional T1 Mux and Services
656 ☐ Videoconferencing/Teleconferencing
657 ☐ WATS/MTS

INTERNET/ELECTRONIC COMMERCE

658 ☐ Internet Access Providers/Services
659 ☐ Firewalls
660 ☐ Web Servers
661 ☐ Internet Software Tools

OTHER

662 ☐ Education and Training
663 ☐ Storage Cabinets/Furniture

ISSUE DATE 8/26/96

CARD MUST BE RECEIVED BY 11/26/96

PASS ALONG

Pass this card along to a colleague so they, too, can get valuable product information FREE.

NAME

TITLE

COMPANY

STREET

CITY/STATE/ZIP

PHONE
(   )

FAX
(   )

E-MAIL ADDRESS

FREE Product Info

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 716 PITTSFIELD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

NetworkWorld

PO BOX 5090
PITTSFIELD MA 01203-9838

Your resource for enterprise network computing information.

FREE Product Info

FREE Product Info

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 716 PITTSFIELD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

NetworkWorld

PO BOX 5090
PITTSFIELD MA 01203-9838

Market Report

A dose of reality about Ethernet switching

Natalie Winnett

Analysts, journalists and vendors are all reporting the rapid market acceptance of switching technology. However, research shows that most organizations are actually buying only a few smaller switches and are buying them from a variety of vendors.

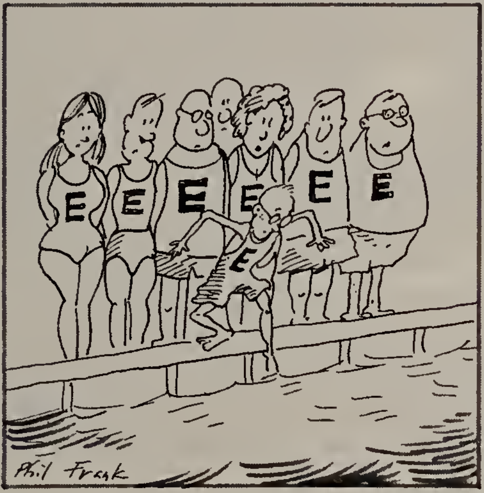
A recent study of 85 organizations of varying sizes (41% having over 10,000 employees, and 45% making over $500 million in annual revenue) conducted by Sage Research, Inc. finds that 57% of those planning to purchase Ethernet switches in 1996 intend to buy no more than five switches.

The study also finds that 72% of total Ethernet switch units to be sold in 1996 will have no more than eight ports per switch.

The research further reveals that brand loyalty is rare. In fact, many of the surveyed organizations are either buying from multiple vendors or changing vendors in 1996.

There are several explanations for this buying behavior.

First, user companies are still testing the waters. Switching technology is in its introductory stage, and users are hesitant to make a substantial investment. So if you're not using switching yet, don't worry — most other companies are in the same boat.



Second, many companies are deciding whether it is more cost-effective to jump headfirst into high-speed technologies such as ATM or Fast Ethernet or budget for what could be a temporary solution.

Third, many companies understand that the price of switches is inflated because of the newness of the technology. They are willing to wait until the price comes down before investing.

The price of Ethernet switches certainly will decline over the next year — not only because the technology is maturing, but also because the number of Ethernet switch manufacturers is increasing.

The number of vendors entering the switching marketplace is growing monthly. Switch vendors are dropping their prices to attract customers and will continue to do so. Fierce competition has driven down the price of low-end switches to as little as $150 per port.

Another positive effect of this competition is the proliferation of niche products. In order to grow, or even stay afloat, smaller vendors are targeting particular markets with differentiated switches. These products are often more expensive but offer unique features such as special virtual LAN capabilities and the ability to interoperate with a wide variety of LAN technologies.

A third benefit of increased competition within the switch market is the trend toward one-stop shopping. Vendors' product-line strategies have changed dramatically over the past year.

Many are extending their product offerings to provide end-to-end networking solutions. For example, Madge Networks, Inc., which was once primarily a token-ring manufacturer, has invested in Ethernet and ATM companies in order to provide a full product line.

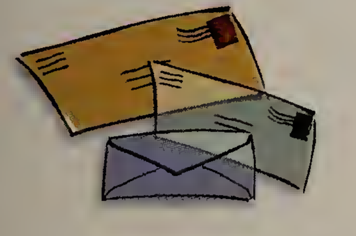
Although vendors that broaden their product lines through mergers and acquisitions aim to improve overall network component compatibility, product integration is a concern. It's vital to know which products the vendor plans to incorporate into its product family portfolio, where they are more likely to be part of a future migration path to ATM, and which are point products with no viable upgrade path.

It's also important that network components, particularly those acquired through mergers and acquisitions, have a common network management system.

While the market potential for Ethernet switching is vast, few companies currently are investing wholeheartedly in this new technology. Once the price of switching drops and organizations gain confidence with the technology, we will see greater substantial, dedicated investment.

Winnett is a market research analyst with Sage Research in Natick, Mass. She can be reached at (508) 655-5400 or via the Internet at natalie@sageresearch.com.

MESSAGE QUEUE



In control

While Thomas Nolle's opinion column on the Quality of Service (QoS) debate (July 15, page 40) raises some valid points, it also leaves the reader with some misleading impressions. Specifically, Nolle implies that there is no way to control users or applications that seek to request bandwidth or other QoS functions via RSVP.

First, it's important to note that RSVP is receiver-oriented — the receiver, not the sender, requests a resource reservation, which is based largely on what the receiver can accommodate.

While it's theoretically possible that a receiver will ask for all the bandwidth it can get, it will hold onto that bandwidth only as long as the session with that particular sender is active.

Second, RSVP's authors clearly understand that some policy controls are required to ensure that a user or application has permission to make reservations, and what restrictions — if any — might apply to these reservations. Although RSVP does not specify the contents of policy data, the RSVP protocol itself is capable of carrying such policy data.

Early adopters of RSVP would be well advised to consider the current lack of policy controls and the possible problems that might arise. However, it's only a matter of time before such controls are defined and implemented.

The Internet Engineering Task Force is in the process of defining models and mechanisms for policy control, and could have specifications available next summer. On the vendor front, Novell, Inc. sees Novell Directory Services as the natural repository for policy control information and is actively working on an implementation of WinSock 2 that will enable NDS to play this role. (It's important to note that WinSock 2 provides generic access to QoS capabilities, including those supported by RSVP and ATM.)

Network managers need to be aware that RSVP alone does not provide QoS capabilities anywhere near those of ATM — other IP-related technologies, some of which are still being defined, must work hand-in-hand with RSVP.

Mary Petrosky
Senior analyst
The Burton Group
San Mateo, Calif.

Nolle responds: Companies can ensure a particular network behavior only if they can enforce it. RSVP may have hooks for future policy management, but no standards for that exist today. Once a company allows any application to request QoS — sender of data or receiver, client or server — it runs the risk that the application may make a request inconsistent with the company's view of the application's importance. This will increase network costs and possibly affect the performance of other users and applications.

That users should evaluate this outcome before buying in to the current IP craze, as you suggest, is the conclusion of the column.

NetworkWorld

Editor In Chief
John Gallant
Editor
John Dix

NEWS
News Editor
Doug Barney
Associate News Editor
Bob Brown
Enterprise Editor
Charles Bruno
Phone: (407) 381-7801; Fax: (407) 381-7903

NETWORKWORLD FUSION
Adam Gaffin - Online Editor
Phone: (508) 820-7433; Fax: (508) 820-3467
Chris Nerney - Online Senior Writer
Phone: (508) 820-7451; Fax: (508) 820-3467

WANs & INTERNETWORKING
Michael Cooney - Senior Editor
Phone: (703) 830-8138; Fax: (703) 830-7963
Jim Duffy - Senior Editor
Phone: (508) 820-7525; Fax: (508) 820-3467
Tim Greene - Senior Writer
Phone: (508) 820-7422; Fax: (508) 820-3467

CARRIER SERVICES
Joanie Wexler - Senior Editor
Phone: (415) 938-0670; Fax: (415) 938-0676
David Rohde - Sr. Washington Correspondent
Phone: (202) 879-6758; Fax: (202) 347-2365

LOCAL NETWORKS
Christine Burns - Senior Writer
Phone: (508) 820-7456; Fax: (508) 820-3467
Jodi Cohen - Senior Writer
Phone: (508) 820-7449; Fax: (508) 820-3467

CLIENT/SERVER APPLICATIONS
Barb Cole - Senior Editor
Phone: (619) 728-8858; Fax: (619) 728-8886
John Cox - Senior Editor
Phone: (508) 834-0554; Fax: (508) 834-0558

INTRANETS & THE 'NET
Ellen Messmer - Sr. Washington Correspondent
Phone: (202) 879-6752; Fax: (202) 347-2365
Carol Sliwa - Senior Writer
Phone: (508) 820-7427; Fax: (508) 820-3467

INTRANET MAGAZINE
Beth Schultz - Executive Editor
Phone: (312) 283-0213; Fax: (312) 283-0214
Peggy Watt - Senior Editor
Phone: (415) 903-9519; Fax: (415) 968-3459

Managing Editor
Michelle Psyhogeos
COPY DESK/LAYOUT
Clare Mansfield - Assistant Managing Editor
Sandra Gittlen - Copy Editor
John Robinson - Copy Editor
Wendy Hodgson - Layout Editor
Lori Montemurro - Layout Editor

ART
Rob Stave - Design Director
Thomas Norton - Associate Art Director
Allyson Nickowitz - Senior Designer
Pauline Chouinard - Graphics Coordinator

FEATURES
Features Editor
Paul Desmond
Phone: (508) 820-7419; Fax: (508) 820-1103
Jim Brown - Managing Editor, Features
Phone: (508) 820-7408; Fax: (508) 820-1103
Susan Collins - Associate Features Editor
Phone: (508) 820-7413; Fax: (508) 820-1103
Kathy Scott - Assistant Features Editor
Phone: (508) 820-7489; Fax: (508) 820-1103
Reviews
Lee Schlesinger - Test Center Director
Phone: (508) 820-7416
William Rinko-Gay - Director, Network World/PC World Server Test Center
Phone: (713) 376-8771; Fax: (713) 251-7857;
E-mail: bill_rinko-gay@pcworld.com
Test Alliance Partners
Todd Coopee, Trinity College; James Gaskin, Gaskin Computer Services; Steven Goldberg, +G Systems; John Ketchersid III, Latsu, Inc.; Bob Larribeau, Larribeau Associates; Howard and Kristin Marks, Networks Are Our Lives; Edwin Mier, Mier Communications, Inc.; National Computer Security Association; David Rorabaugh, Venture Computer Services; Joel Snyder, Opus One
Contributing Editors
Daniel Briere, David J. Buerger, Mark Gibbs, James Kobielus, Edwin Mier, Mark Miller, Alan Pearce
Buyer's Guide Contributors
Tony Croes, Linda Musthaler, **Currid & Co.;** Mark Miller, **DigiNet Corp.;** James Kobielus, **LCC, Inc.;** Edwin Mier, **Mier Communications, Inc.;** Daniel Briere, Christopher Finn, Christine Heckart, Liza Henderson, Beth Gage, **TeleChoice, Inc.**
Teletoons
Phil Frank, Joe Troise

Assistant to the Editor
Cheryl Crivello
Editorial Assistant
Glenna Fasold

Colin Ungaro - **President/CEO**
Evilee Thibeault - **Senior Vice President/Publisher**
Mary Fanning - **V. P. Finance & Operations**
Mary Kaye Newton - **Assistant to the President**
Board of Directors
Colin Ungaro, Pat McGovern, Bob Metcalfe, Joe Levy, Kelly Conlin

Where Does Your Edge Switch Reside?

Let's cut right to it.

Only one ATM switch company has the edge when it comes to multimedia applications like real-time data, voice and video: GDC.

Our "telco-tough" APEX ATM switches satisfy the demands of the top service providers and leading end-user corporations worldwide. Just ask MCI, France Telecom, Bear Stearns and Boatmen's Bank.

The reason: only our APEX ATM line can truly deliver cutting edge services like frame relay, VPNs, distance learning and more. They provide higher bandwidth for advanced carrier capabilities such as broadcast-quality video conferencing. Plus they're reliable. Our switches keep working when others burn-out.

Best of all, they're competitively priced up front. And designed with the vision to cost-effectively add tools like route management, accounting management and circuit provisioning.

To get the edge, call for our white paper on advanced ATM switching technology. It's anything but boring.

General DataComm

Call **1-800-SWITCH-ON** or http://www.gdc.com.

See us at Networld + Interop booth number 5426

All trademarks and registered trademarks are the property of their respective holders.

Circle Reader Service **#46**

Little routers, big bite

They're small, fast and will soon be everywhere. They're low-end routers and they're coming after your modems.

ILLUSTRATION BY ROB ZAMMARCHI

By Mark Miller

If you're looking for action in the router market, the low end is where you want to be.

Router vendors are turning loose feature-rich, low-end offerings to assault entrenched technology at the network fringes, most notably modems. These offerings are inexpensive, easy-to-install little beasts — some no larger than a credit card — that can access ISDN, switched digital or even frame relay links, in addition to traditional dial-up lines.

At the same time, new bandwidth-optimization and data-compression software enable you to wring every last bit's worth of capacity from those circuits.

"Today's low-end router is a simple evolution of the single-user modem, but with greater functionality and at a lower cost per bit transferred," says Jeff Low, vice president of marketing at Proteon, Inc. Indeed, the most inexpensive low-end routers cost about the same as three or four modems, a bargain when you consider the extra speed, functions and flexibility that routers provide.

A number of middle- to low-tier routers, which we've lumped together in this Buyer's Guide, now have features and functions that were once the exclusive domain of their high-end brethren, including support for SNA. We examined those products in an earlier Buyer's Guide (*NW*, July 15, page 43).

This has led to low-end routing technology becoming quickly commoditized, which makes the products more economically viable.

"Fortune 500 companies have been tying in remote offices using mainframes, modems and terminals for years," says Steve Smith, product line manager for remote office solutions at 3Com Corp. "But now smaller businesses — which may have previously been unable to use remote access because of the high costs — are able to use many of these same concepts, but with more efficient technology. The price points — for both the carrier services and the routing technology — are now attractive enough to open up a new segment of the small business market."

That new segment is known as the small office/home office (SOHO) market, which is the bottom tier of the overall market, after the traditional branch office segment. Not surprisingly, one of the key drivers in the SOHO market is the thirst for higher speed Internet access than a modem can provide. Routers in the SOHO segment are also used by telecommuters and professional or home offices with less than a half-dozen users, such as a real estate agency or a doctor's office.

Cost watching

"We advise our customers to consider three key issues when looking at branch office and SOHO routers: cost, cost and cost," says Richard Benwell, routers marketing manager at Digital Equipment Corp. "But these costs are not all the same."

The first cost, Benwell says, is the equipment, which typically accounts for 20% of what you'll pay over the router's lifetime. The recurring WAN services are higher, at about 35%. But the highest cost, at about 45%, is maintaining the equipment configuration with ongoing support and management.

Although it seems every vendor is doing what it can to keep equipment prices down, Digital's strategy is to focus on lowering support costs in branch offices, where little, if any, technical expertise may exist.

"If you have remote users that have no access to experts, then the support costs may be even higher than normal," Benwell says. "Perhaps more importantly are the frustrations that these remote managers may go through. As a result, we give the highest priority to making it easy to install, configure and maintain our products."

MODEM vs. LOW-END ROUTER COSTS COMPARED

Modem	
Acquisition cost per PC: (1)	$83.33
Yearly line costs based on 15 hours per week of usage:	$600.00
Total:	**$683.33**
Dial-up router	
Acquisition cost for initial PC: (2)	$433.33
Yearly line costs based on 15 hours per week of usage:	$600.00
Total:	**$1,033.33**
(Add $16.66 to acquisition cost for a LAN adapter for each additional PC)	
Leased-line router	
Acquisition cost for initial PC: (3)	$616.66
Yearly line costs:	$3,600.00
Total:	**$4,216.66**
(Add $16.66 to acquisition cost for a LAN adapter for each additional PC)	
ISDN router	
Acquisition cost for initial PC: (4)	$483.33
Yearly line costs based on 15 hours per week of usage:	$720.00
Total:	**$1,203.33**
(Add $16.66 to acquisition cost for a LAN adapter for each additional PC)	

Note: Acquisition costs have been amortized over three years.
(1) Includes cost of a 28.8K bit/sec modem and dial-up line installation fee.
(2) Includes cost of router, 10Base-T hub, 28.8K bit/sec modem, LAN adapter and dial-up line installation fee.
(3) Includes cost of router, DSU/CSU, 10Base-T hub, LAN adapter and 56K bit/sec leased-line installation fee.
(4) Includes cost of router, ISDN terminal adapter, 10Base-T hub, LAN adapter and ISDN BRI line installation fee.

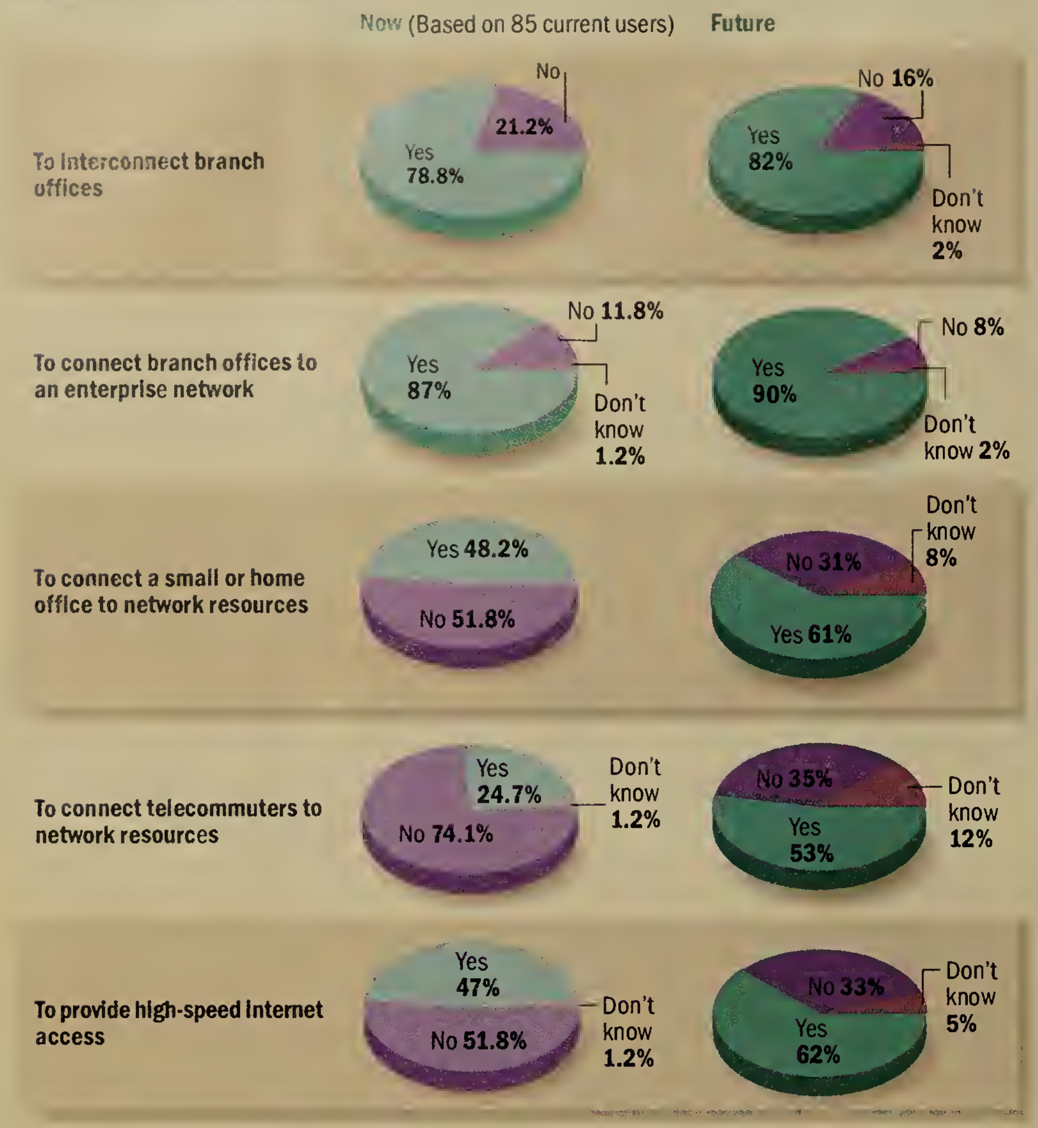
SOURCE: INFONETICS RESEARCH, INC., SAN JOSE, CALIF.

If you're also looking for easily configured routers, check out Advanced Computer Communications, which includes Web Wizard software with its Congo Voice Router. Web Wizard enables you to get up and running within minutes by using a PC-based Web browser. The software also includes an

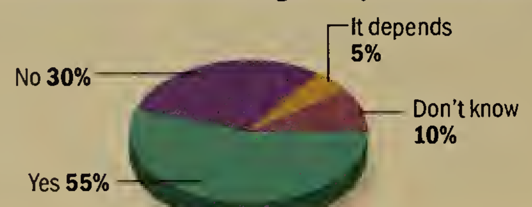
Reader views on low-end routers

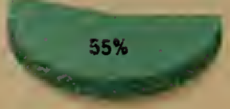
Based on 100 interviews

How do/will you use low-end routers?



Are low-end routers powerful and affordable enough to replace modems?





Yes

"Because the prices of routers have come down. They're cost-justifiable in cases where bandwidth is needed."

"Routers run multiple protocols, they have more speed, and prices are constantly dropping."

"Yes, because of functionality and cost. I can buy a router for almost the same price as a modem."

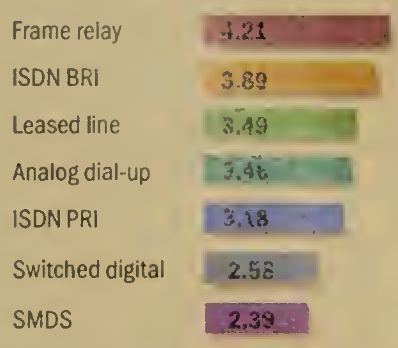
"Modems don't offer the proper connectivity to a LAN environment."

No

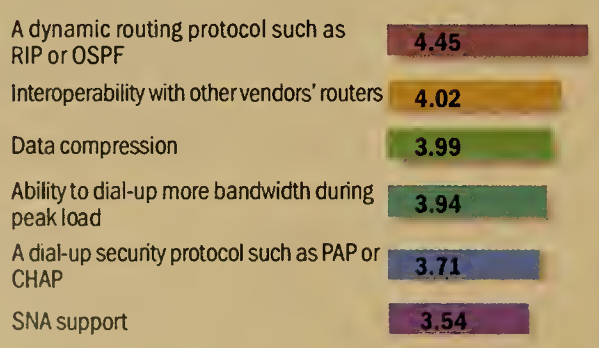
"Routers are powerful enough, but some are still too costly."

"Routers have the capability to transport IP or IPX but their cost is twice what it should be."

How important is it that a low-end router support the following WAN interfaces?
(Highest possible score of 5)



How important are the following features in selecting a low-end router?
(Highest possible score of 5)



The survey was conducted by Focus Data, an independent market research firm in Framingham, Mass., that gathers primary data concerning the enterprise network environments and needs of end users. To purchase full survey results, call Mona Dabbon at (508) 626-2556 or send E-mail to mdabbon@focusdata.ultranet.com.

online tutorial on how to order ISDN service. It even has step-by-step instructions, complete with diagrams and photos, on how to set up the router hardware, including cables and connectors.

Compatible Systems Corp.'s products include a package called RouterView, a Windows or Macintosh application that eases management woes. Compatible Systems claims the graphical user interface-based package enables you to configure a remote router over the Internet in less than 10 minutes. The package also lets you perform remote router diagnostics. The company — and most other vendors — also provides an SNMP management agent for its routers.

Another product that offers configuration flexibility is Novell, Inc.'s software-based NetWare MultiProtocol Router.

"The NetWare MultiProtocol Router differs from external routers in that it adds itself directly to the network operating system," says Clyde Morgan, product-line manager for Novell. "This coupling leverages the speed, management and security capabilities native to NetWare while reducing implementation cost."

The NetWare MultiProtocol Router enables you to select exactly the foundation and subcomponents you need in a router. It also provides the flexibility to enhance individual elements as requirements change.

As server processor speeds increase, WAN adapters improve, network interface cards change and so on, you simply choose from the configuration alternatives to adjust accordingly instead of swapping out hardware.

Optimizing WAN links

Other vendors attack the WAN component of the cost equation. In deploying low-end routers, you can easily get confused over whether to use asynchronous dial-up, leased-line, switched digital services, ISDN, frame relay, or other services such as ATM.

If you're among those who are confused by all the WAN options, look at Whittaker Xyplex, which provides a partial solution with its WANscape architecture. Implemented across the firm's entire product line, the architecture enables you to match WAN services, user applications and associated bandwidth requirements with a minimum of configuration headaches.

For example, suppose a frame relay link with a 32K bit/sec committed information rate is installed between headquarters and a remote location. When data coming into the router exceeds a user-defined threshold, say 28K bit/sec, the router will dial up an asynchronous or ISDN link to carry the excess data. When the need for more bandwidth is satisfied, the temporary connection is dropped.

WANscape supports a variety of other bandwidth management features, including bandwidth-on-demand, inverse multiplexing, load balancing, primary link backup, time-of-day circuit control, call priority and data compression.

If you're more interested in going with tried-and-true technology, remember 3Com Corp. introduced some of the earliest WAN bandwidth-saving features under its Boundary Routing architecture, which creates a master/slave relationship between a 3Com central-site router and a Boundary Routing-compliant remote-site router from 3Com or another vendor.

Boundary Routing has several key objectives, including conservation of WAN bandwidth and optimization of LAN traffic. In meeting those objectives, Boundary Routing also eases configura-

COMPRESSED DATA

All the products listed in the Buyer's Guide chart on pages 46 and 48 support data compression except those from Emulex, Lantronix and Plexcom as well as Penril's BRX 5700 Series and RNS' NetHopper NH-BRI 600 Series and NetHopper NH-Sync+.

Look closely at product subtleties

Distinguishing between different vendors' low-end routers can be a challenge because at first glance they all look alike. But if you look closely at the products' subtleties, key differences will emerge.

For instance, a few of the low-end routers in the Buyer's Guide chart on page 46 only support a static routing configuration that would require manual reconfiguration every time a topological change needs to be made.

You may be better off with a low-end router that supports a dynamic routing protocol such as the Routing Information Protocol or Open Shortest Path First. Dynamic routing protocols enable routers to exchange information to continually update routing tables.

You should also look for compatibility with other vendors' routers. Many low-end routers with dial-up ports operate in an asymmetric manner, much like a modem. This means you may never know what other vendor's low- or even high-end router will be on the other end of the wire, just like you never know what vendor's modem is being used to pick up your call in a modem pool.

As a result, interoperability testing should become a key ingredient of your overall network implementation. Ask vendors if they have interoperability testing programs for their low-end routers.

— Mark Miller

tion and management.

In Boundary Routing, central- and remote-site routers run filtering and forwarding engines that handshake during system startup. The remote site automatically senses the speed of the incoming line and tests recursively for the correct link protocol such as frame relay or PPP. Once it negotiates the proper filtering options with the central site, the remote site is up and running.

At the remote site, a router employing Boundary Routing technology uses special algorithms that automatically keep unwanted packets off the WAN link.

Routing on a credit card

The size of a low-end router is also becoming an issue, and Sourcecom Corp. is one of the first vendors to take a stab at stuffing router functionality onto a module about the size of a credit card. The firm's InnerWare G3/G3.5 OEM product combines IP and IPX routing with bridging and a 10Base-T port onto a 3-inch-by-5 1/2-inch card.

Sourcecom sells the product to other vendors that can integrate it into a LAN server, a WAN access device with a V.35 interface, an ISDN terminal adapter, a High-speed Digital Subscriber Line or Asymmetric Digital Subscriber Line access device, or a cable modem. The firm also uses InnerWare G3/G3.5 in its own InCarda series of PC-based router boards. In addition, the company markets a series of stand-alone or rack-mountable router products called InRoute.

"Our target market is SOHO customers who have a requirement for multimegabit-speed access to the Internet and private networks, but with a lower level of functionality than a traditional router," says Michael Zadikian, vice president of marketing at Sourcecom.

InnerWare includes Sourcecom's Optimized Application Specific Integrated Circuits, internetworking application code that performs route calculations and manages higher layer protocols, and a Decoupled Management Interface that enables the host device to control module operation.

The InCarda family includes ISA, EISA and PCI expansion cards designed for branch-office file servers and Web servers. Each InCarda board contains one Ethernet port and one WAN port. It routes IP and IPX traffic and supports PPP, High-Level Data Link Control and frame relay protocols at T-1 speeds.

But Sourcecom isn't content with all that, Zadikian says. The company would like to see the InnerWare module get small enough to drive the total router cost down to the $300 range. Today, InCarda products range from $745 to $1,245.

"With a $300 price tag, you are comparable with a 28.8K bit/sec modem," Zadikian says. "However, you get up to 6M bit/sec of link speed."

Securing the low end

As low-end routers are more widely deployed, you'll have to deal with more

WHAT TO LOOK FOR IN A LOW-END ROUTER

Here's a few nuggets of data to nibble on as you figure out what router features you'll need to support specific applications in the branch office or small office/home office (SOHO) market segments.

SEGMENT: BRANCH OFFICE

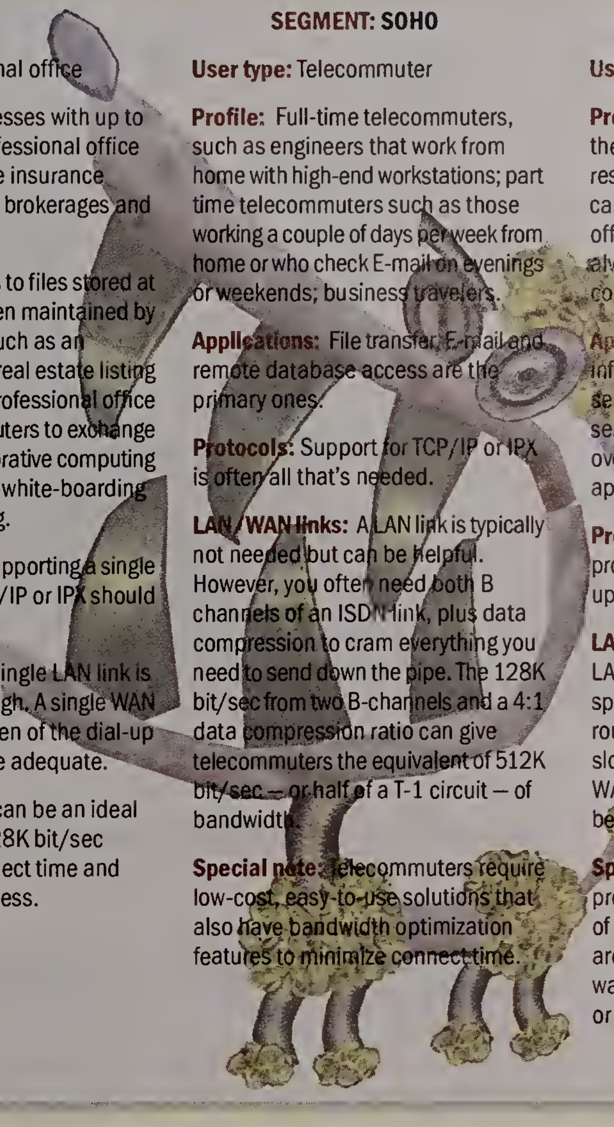
Profile: A branch office typically has up to 20 users that need connection to a headquarters location over an enterprise network. Branch offices also need to establish interbranch communications.

Applications: Many and varied, including client/server computing, file transfer, access to SNA host, online transaction processing, E-mail, remote database access and other forms of distributed processing.

Protocols: These applications require a router to support multiple protocols, typically TCP/IP, IPX and SNA.

LAN/WAN links: You can often get by with a single LAN and two WAN ports. One WAN port should support a leased line supporting frame relay or some other form of fast packet transfer into the enterprise network. The other WAN port should support a dial-up or ISDN line for leased-line backup and temporary connections to nonenterprise network sites.

Special note: If you need to connect to a nonenterprise network site for more than 20 hours a week, the economics favor some type of flat-rate WAN connection such as frame relay or a leased line over a dial-up or ISDN circuit.



SEGMENT: SOHO

User type: Professional office

Profile: Small businesses with up to six users. Typical professional office environments include insurance agencies, real estate brokerages and medical offices.

Applications: Access to files stored at a central site and often maintained by a business partner such as an insurance company, real estate listing service or hospital. Professional office users can also use routers to exchange E-mail and for collaborative computing applications such as white-boarding or video conferencing.

Protocols: A router supporting a single protocol such as TCP/IP or IPX should do the trick.

LAN/WAN links: A single LAN link is often more than enough. A single WAN connection, most often of the dial-up variety, would also be adequate.

Special note: ISDN can be an ideal solution due to its 128K bit/sec bandwidth, fast connect time and relative inexpensiveness.

User type: Telecommuter

Profile: Full-time telecommuters, such as engineers that work from home with high-end workstations; part time telecommuters such as those working a couple of days per week from home or who check E-mail on evenings or weekends; business travelers.

Applications: File transfer, E-mail and remote database access are the primary ones.

Protocols: Support for TCP/IP or IPX is often all that's needed.

LAN/WAN links: A LAN link is typically not needed but can be helpful. However, you often need both B channels of an ISDN link, plus data compression to cram everything you need to send down the pipe. The 128K bit/sec from two B-channels and a 4:1 data compression ratio can give telecommuters the equivalent of 512K bit/sec — or half of a T-1 circuit — of bandwidth.

Special note: Telecommuters require low-cost, easy-to-use solutions that also have bandwidth optimization features to minimize connect time.

User type: Internet power user

Profile: These people are regularly on the Internet conducting business research or commerce. These users can take up residence in a professional office or be a telecommuter, but almost always consider a dedicated Internet connection overkill.

Applications: Downloading information from the Internet, searching the World-Wide Web and sending messages to trading partners over the Internet are typical applications.

Protocols: These users run a single protocol, TCP/IP, most often over a dial-up link that uses PPP.

LAN/WAN links: You may want a single LAN link so you can establish a high-speed channel from the PC to the router. Otherwise, you're stuck with a slow serial port connection. A single WAN interface, typically ISDN, should be enough.

Special note: Internet power users are probably more sensitive to the speed of the WAN connection because they are often sitting at the terminal and waiting for a file transfer to complete or a graphic to be downloaded.

NetworkWorld Short LIST

Low-end routers

The Short List highlights products Network World *recommends you examine when purchasing low-end routers. The branch office products mentioned here support multiple LAN and WAN protocols (including SNA), can be integrated with other products such as hubs or high-end routers, include WAN optimization techniques and come with strong network management tools. The small office/home office (SOHO) routers listed here support telecommuters or Internet power users; each product offer something unique. Your needs may differ.*

Branch office

Bay Networks, Inc.'s Access Node and **Access Node Stack** support Ethernet and token ring, plus synchronous leased-line and ISDN Basic Rate Interfaces. On the WAN side, dial backup, bandwidth-on-demand, dial-on-demand and data compression are available. For network management, the products support an optional integrated Ethernet Remote Monitoring data collection module. In addition, they work with other BayStack products, including 10Base-T and 100Base-T hubs and an Ethernet workgroup switch.

3Com Corp.'s SuperStack II NetBuilder includes options for Ethernet and token ring plus as many as three WAN ports supporting serial, frame relay, X.25 or ISDN lines. The product is also part of 3Com's Boundary Routing system architecture, which means the central-site router can facilitate many of the routing tasks for the remote location, including remote configuration changes and software updates.

The **Whittaker/Xyplex Network 3000** and **RouteRunner** family of routers supports a key feature called WANScape, which provides a variety of WAN bandwidth management features for leased lines and switched services. These features include bandwidth-on-demand, inverse multiplexing, load balancing, link and circuit backup, time-of-day circuit control, call priority and data compression.

SOHO

Security is the strong suit of **Livingston Enterprises Inc.'s PortMaster** family. The FireWall IRX model features extensive packet filtering, which includes the ability to filter traffic based on source and/or destination addresses for a whole network, subnet or individual device. You can also filter based on the protocol service, such as file transfer, E-mail or World-Wide Web access. Such protocol service filtering, for example, makes it possible to permit passage of only those File Transfer Protocol packets that are in response to a particular FTP session on your network.

Proteon, Inc.'s Globetrotter remote access routers provide out-of-the-box network access for small offices and Internet power users. Proteon has tested these products for compatibility and interoperability with a number of other router vendors' products, including units from Advanced Computer Communications, Bay Networks, Inc., Cisco Systems, Inc., Digital Equipment Corp., Motorola, Inc. and 3Com. The Globetrotters' $795 to $1,195 list price, small modem-like size and easy configuration make them an economical solution.

Sourcecom Corp. has reduced a high-end router's code and hardware to the size of a credit card to form its Innerware module, the basis for the **Incarda** line of PC card-based routers. Each Incarda product has one Ethernet and WAN port, can route IP and IPX, and supports transparent bridging over PPP, High-level Data Link Control and frame relay connections. Management options include NetGrip, a proprietary system, plus SNMP and telnet.

security threats. "Implementing remote access places internal information systems at risk by creating two doors through which potential invaders can enter," says Alex Henthorn, product marketing engineer at Livingston Enterprises, Inc.

"Internet connections are an obvious front door where most hackers attempt invasions, and where most organizations focus their efforts. However, remote single-user and LAN dial-up access represents a back door for these same intruders and must also be secured," he explains.

There is much more product detail data on Network World Fusion. Select NetRef, then Product Reviews/Buyer's Guide and click on low-end routers, and you'll find a chart with the following information:

- **Filtering and throughput rates**
- **Bridging algorithms supported**
- **Distributed management protocols supported**
- **SNMP MIBs supported**
- **SNA support techniques**

That's why a number of low-end routers now support dial-up security protocols designed to work with PPP. The Password Authentication Protocol (PAP) provides a simple way for a remote device to establish its identity — a process known as authentication. A drawback of this scheme is that the ID and password are sent unencrypted, providing no protection against an eavesdropper.

The Challenge Authentication Handshake Protocol improves on PAP by using a three-way handshake between remote and central sites. After the remote site connects, the central site sends a challenge message, which requires the correct calculated response from the remote location; otherwise, communication is terminated.

A new security standard, invented by Livingston and called Remote Authentication Dial In User Service (RADIUS), is a client/server technology for centrally managing dial-in user authentication and session accounting across an enterprise network. When a remote user attempts to connect to a LAN, a router or communications server using RADIUS client software queries a RADIUS server for authentication. Livingston is pushing RADIUS as an IETF standard and has gained exposure in the commercial arena.

See Routers, *page 48*

Low-end routers

Company	Product	Platform	Maximum interfaces	Max. LAN ports		Max. WAN ports					Router protocols	Protocols routed								Pricing
				Ethernet	4M/16M bit/sec token ring	Analog leased line	Digital leased line	Dial-up	ISDN	Frame relay		AppleTalk	Banyan VINES	DECnet	CLNP	IPX	SNA	TCP/IP	XNS	
Advanced Computer Communications (800) 444-7854	Amazon	Stand-alone	LAN: 5 WAN: 18	5	3			18	BRI: 6 PRI: 3	18	OSPF, PPP, RIP	✔		✔		✔	✔	✔	✔	$5,000-$19,235
	Colorado	Stand-alone	LAN: 2 WAN: 4	2	1			3	BRI: 1	3	OSPF, PPP, RIP	✔		✔		✔	✔	✔	✔	$2,295-$4,595
	Congo/Congo Voice Router	Stand-alone	LAN: 1 WAN: 1	1					BRI: 1		PPP					✔		✔		$895-$1,495
	Danube	Stand-alone	LAN: 1 WAN: 1	1				1	BRI: 1	1	OSPF, PPP, RIP	✔		✔		✔	✔	✔	✔	$1,995-$3,345
	Nile	Stand-alone	LAN: 1 WAN: 2	1	1			2	BRI: 1	2	OSPF, PPP, RIP	✔		✔		✔	✔	✔	✔	$2,895-$4,295
	Yukon Frame Relay	Stand-alone	LAN: 1 WAN: 1	1						1	PPP					✔		✔		$1,395-$1,995
	Yukon ISDN	Stand-alone	LAN: 1 WAN: 1	1					BRI: 1		PPP					✔		✔		$1,295-$1,795
Aurora Technologies, Inc. (617) 290-4800	WANMultiServer	Stand-alone	WAN: 64			64	64	64			PPP, RIP, SLIP					✔	✔	✔		$3,800-$17,000
Bay Networks, Inc. (800) 822-9638	Access Node	Stand-alone	LAN: 2 WAN: 3	2	1	3	3	3	BRI: 1	3	ISO IS-IS, OSPF, PPP, RIP, RIP 2	✔	✔	✔		✔	✔	✔	✔	$2,195-$7,000
	Access Stack Node	Stand-alone	LAN: 24 WAN: 40	24	24	24	24	24	BRI: 48 PRI: 12	24	ISO IS-IS, OSPF, PPP, RIP, RIP 2	✔	✔	✔	✔	✔	✔	✔	✔	$60,000
Cisco Systems, Inc. (408) 526-4000	Cisco 765 and 766	Stand-alone	LAN: 1 WAN: 2	1					BRI: 1		PPP, RIP, RIP 2, other					✔		✔		$999-$1,498
Compatible Systems Corp. (800) 356-0283	MicroRouter 2200R	Stand-alone	LAN: 2 WAN: 2	2		1	2	1	BRI: 2	2	PPP, RIP, RIP 2	✔		✔		✔		✔		$1,695-$2,195
	MicroRouter 3400R	Stand-alone	LAN: 1 WAN: 4	1		4	4	2	BRI: 4	4	PPP, RIP, RIP 2	✔		✔		✔		✔		$2,995
	RISC Router 3800R	Stand-alone	LAN: 1 WAN: 12	1		12	12	12	BRI: 12	12	PPP, RIP, RIP 2	✔		✔		✔		✔		$3,395
	RISC Router 4000S	Stand-alone	LAN: 4	4							RIP, RIP 2	✔		✔		✔		✔		$3,495
Cray Communications, Inc. (301) 317-7710	MatchBox Router/ BRI-MR-1x14	Stand-alone	LAN: 1 WAN: 2	8		1		1	BRI: 1		PPP, RIP, RIP 2, SLIP, other					✔		✔		$1,795-$2,295
	MatchBox Router/ FR-MR-1x10	Stand-alone	LAN: 1 WAN: 2	8		2		2		2	PPP, RIP, RIP 2, SLIP, other					✔		✔		$1,495-$1,995
	MatchBox Router/ X.25-MR-1x13	Stand-alone	LAN: 1 WAN: 2	8		2		2			PPP, RIP, RIP 2, SLIP, other					✔		✔		$1,495-$1,995
CrossComm Corp. (800) 388-1200	XL5 Multiprotocol Router	Stand-alone	LAN: 1 WAN: 2	1	1		2		BRI: 2	2	OSPF, PPP, RIP, RIP 2					✔	✔	✔		$1,550-$4,495
Develcon Electronics, Ltd. (800) 423-9210	Orbitor 1000 ISDN Small Office Bridge/Router	PC card	LAN: 1 WAN: 1	1					BRI: 1		PPP, RIP, other					✔		✔		$595-$1,095
	Orbitor 2000 TeleRouter	Stand-alone	LAN: 1 WAN: 1	1					BRI: 1	1	PPP, RIP					✔		✔		$950-$1,250
	Orbitor 3000 Branch Office Bridge/Router	Stand-alone	LAN: 1 WAN: 2	1		2	2	2	BRI: 1	1	PPP, RIP, other					✔		✔		$1,395-$3,905
Digi International, Inc. (800) 344-4273	Digi Retoura	Stand-alone	LAN: 1 WAN: 5	1		2	2	2	BRI: 2	2	RIP					✔		✔		$1,495-$1,795
Digital Equipment Corp. (800) 332-7253	RouteAbout Access EI	(1)	LAN: 1 WAN: 2	1					BRI: 1	1	ISO IS-IS, OSPF, PPP, RIP, other	✔		✔		✔	✔	✔		$2,500-$2,900
	RouteAbout Access EW	(1)	LAN: 1 WAN: 2	1						2	ISO IS-IS, OSPF, PPP, RIP, other	✔		✔		✔	✔	✔		$1,950-$2,450
	RouteAbout Access TW	(2)	LAN: 1 WAN: 2		1					2	ISO IS-IS, OSPF, PPP, RIP, other	✔		✔		✔	✔	✔		$2,450-$2,890
D-Link Systems, Inc. (714) 455-1688	DI-1150	Stand-alone	LAN: 1 WAN: 2	3			2	2		2	PPP, SLIP, other					✔		✔		$1,690-$2,085
Eastern Research, Inc. (800) 337-4374	SpanNet 2500	Stand-alone	LAN: 1 WAN: 2	1		2	2	2		48	OSPF, PPP, RIP, RIP 2, SLIP, other					✔		✔		$1,495
	SpanNet 2500D	Stand-alone	LAN: 1 WAN: 2	1		2	2	2		48	OSPF, PPP, RIP, RIP 2, SLIP, other					✔		✔		$1,795
	SpanNet 2500T	Stand-alone	LAN: 1 WAN: 2	1		2	2	2		48	OSPF, PPP, RIP, RIP 2, SLIP, other					✔		✔		$1,995
Emulex Corp. (800) 368-5391	FrameExpress for NetWare	PC-based	LAN: (3) WAN: 2	(4)	(4)		2			2	OSPF, RIP, other	✔				✔		✔		$1,395-$1,795
FlowPoint Corp. (408) 252-6470	FlowPoint 100	Stand-alone	LAN: 1 WAN: 1	1					BRI: 1		PPP, RIP					✔		✔		$995-$1,495
Gandalf Technologies, Inc. (800) 426-3253	XpressConnect 5242i	Stand-alone	LAN: 1 WAN: 1	1		1			BRI: 1		PPP, other	✔	✔	✔	✔	✔	✔	✔	✔	$1,145-$1,550
	XpressConnect 5250i	Stand-alone	LAN: 1 WAN: 3	1		2	2	2	BRI: 1	2	PPP, other	✔	✔	✔	✔	✔	✔	✔	✔	$1,995-$2,745
Hughes Network Systems, Inc. (301) 601-4299	IX200/IX500-LAN Interface Module	Stand-alone	LAN: 2 WAN: 8	1	1	8	8	8		8	PPP, RIP, RIP 2, SLIP, other					✔	✔	✔		$9,950/ module
	RX50	Stand-alone	LAN: 2 WAN: 3	1	1	3	3	3	BRI: 2	3	PPP, RIP, RIP 2, SLIP, other					✔	✔	✔		$2,950-$5,450
Hypercom Network Systems (800) 577-5501	IEN 1000	Stand-alone	LAN: 1 WAN: 1	1	1	1	1	1		1	OSPF, PPP, RIP, RIP 2, SLIP, other			✔		✔	✔	✔		$1,750-$4,500
IBM (800) 426-2255	2210 Nways	Stand-alone	LAN: 2 WAN: 4	2	2	4	4	4	BRI: 1	4	OSPF, PPP, RIP, other	✔	✔	✔		✔	✔	✔		$2,195-$5,195
Lantronix (800) 422-7055	LRS16, LRS2, LRS1	Stand-alone	LAN: 1 WAN: 16	1		16		16	BRI: 8		PPP, RIP, SLIP, other					✔		✔		$545-$2,495

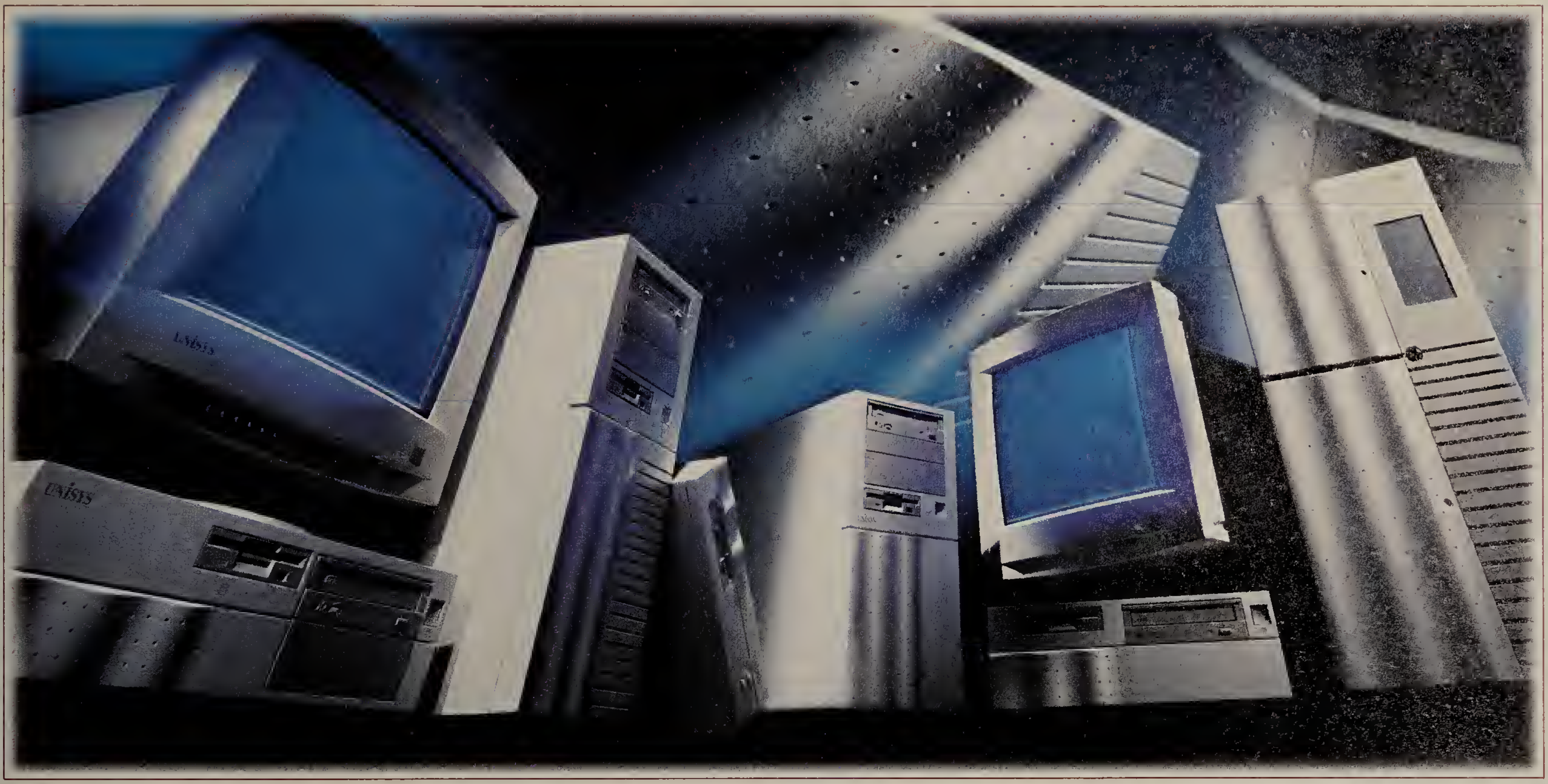
Product names highlighted in color were selected for the Short List.

Chart compiled by Kathy Scott

Footnotes:

(1) Can be configured in a DEChub 90/900 or Digital Multistack.
(2) Can be installed in a DEChub 900 hub.
(3) Slot-dependent.
(4) System-dependent.
(5) Globetrotter 62 only.
(6) Globetrotter 72 only.
(7) RBX 205 only.

CLNP = Connectionless network protocol
IS-IS = Intermediate System to Intermediate System
OSPF = Open Shortest Path First
RIP = Routing Information Protocol
XNS = Xerox Network Systems



Everything you're looking for in PCs.

From a place you probably didn't look.

You might not think of Unisys as a place to find state-of-the-art PCs for your company. But all that's changed with *Aquanta*™ PCs and servers. This new product line matches—and even surpasses—the best the PC world has to offer.

Aquanta means quality, with rigorous testing that ensures mainframe-class dependability for mission-critical applications.

Aquanta means performance, with one of the industry's most powerful and scalable product lines—including multiprocessor Pentium and Pentium Pro models, SMP servers and fault-resilient servers.

Aquanta means compatibility, with support for all major operating systems and networks to simplify client/server computing.

Aquanta means support, through Unisys worldwide experience implementing technology across departments, companies and countries.

And finally, *Aquanta* means this: While we may not be the first place you look for PCs, we just might be the last.

http://www.unisys.com/adv or 1-800-874-8647, ext. 244

© 1996 Unisys Corporation. Aquanta is a trademark of Unisys Corporation. The Intel Inside Logo, Pentium and Pentium Pro are registered trademarks of Intel Corporation.

UNISYS

The Information Management Company

Continued from page 46

Another technique, also developed by Livingston, is a client/server filtering technology called ChoiceNet. It allows you to download filters from a server running ChoiceNet to a dial-in remote access server on a dynamic, per-user basis.

ChoiceNet filtering also provides centrally-managed permit/deny lists that replace traditional filters, which must reside in the memory of a router or remote access server. Client/server filters function like Domain Name Service (DNS) lookups and are cached on the server running ChoiceNet to improve performance.

SMDS SUPPORT

Advanced Computer Communications' Amazon, Colorado, Danube and Nile products, along with offerings from Bay Networks, CrossComm, Motorola and Novell, support Switched Multimegabit Data Service.

There are many potential applications for ChoiceNet, such as ensuring Internet connections are used only for business purposes and defining class of services for Internet connections via per-session filters.

In addition, data compression — which is frequently used with remote office links — provides some degree of security by itself. Both ends of the link must be running the same compression algorithm for the data to be decipherable, meaning that data compression enhances security.

Even with all these considerations, there is one main point to keep in mind: "The overall concern in selecting a low-end router is to connect your applications in a cost-effective way," says Sidney Kriger, product line manager for access products at Bay Networks, Inc.

The new slate of low-end routers being served up by vendors gives you many more options than a modem. Couple the ever-increasing availability of high-bandwidth ISDN pipes with the functionality of today's low-end routers, the days of the modem may be numbered.

Miller is a contributing editor and president of DigiNet Corp., a Denver-based data communications engineering firm. He will lead a Network World Technical Seminar concerning IP Version 6 this fall. He can be reached at mark@diginet.com.

Low-end routers

Company	Product	Platform	Maximum interfaces	Max. LAN ports		Max. WAN ports					Router protocols	Protocols routed								Pricing
				Ethernet	4M/16M bit/sec token ring	Analog leased line	Digital leased line	Dial-up	ISDN	Frame relay		AppleTalk	Banyan VINES	DECnet	CLNP	IPX	SNA	TCP/IP	XNS	
Livingston Enterprises, Inc. (510) 426-0770	PortMaster FireWall IRX	Stand-alone	LAN: 2 WAN: 2	2		1	1	1	BRI: 1	1	OSPF, PPP, RIP, SLIP					✓		✓		$3,195
	PortMaster IRX-111	Stand-alone	LAN: 1 WAN: 2	1		1	1	1	BRI: 1	1	OSPF, PPP, RIP, SLIP					✓		✓		$2,395
	PortMaster IRX-112	Stand-alone	LAN: 1 WAN: 3	1		1	2	1	BRI: 2	2	OSPF, PPP, RIP, SLIP					✓		✓		$2,695
	PortMaster IRX-114	Stand-alone	LAN: 1 WAN: 5	1		1	4	1	BRI: 4	4	OSPF, PPP, RIP, SLIP					✓		✓		$3,250
	PortMaster ISDN	Stand-alone	LAN: 1 WAN: 1	1					BRI: 1		OSPF, PPP, RIP, SLIP					✓		✓		$1,195
	PortMaster PCMCIA	Stand-alone	LAN: 1 WAN: 2	1				1	BRI: 1		OSPF, PPP, RIP, SLIP					✓		✓		$1,395
	PortMaster Synchronous	Stand-alone	LAN: 1 WAN: 2	1		1	1	1	BRI: 1	1	OSPF, PPP, RIP, SLIP					✓		✓		$1,195-$1,495
Micom Communications Corp. (800) 642-6687	NetRunner 75E	Stand-alone	LAN: 1 WAN: 2	1		2	2			2	RIP, other					✓		✓		$1,950
Motorola , Inc. (508) 261-4000	6520 MPRouter	Stand-alone	LAN: 2 WAN: 19	2	1	16	16	16	BRI: 8	4	OSPF, PPP, RIP, SLIP	✓				✓	✓	✓		$2,995-$8,595
	6560 MPRouter Pro	Stand-alone	LAN: 2 WAN: 19	2	1	16	16	16	BRI: 8	4	OSPF, PPP, RIP, SLIP	✓				✓	✓	✓		$5,995-$15,495
Novell, Inc. (800) 638-9273	NetWare MultiProtocol Router 3.1	Software only	LAN: 256 WAN: 64	256	256	64	64	64	BRI: 64 PRI: 64	64	OSPF, PPP, RIP, RIP 2	✓				✓	✓	✓		$895-$10,820
Penril Datability Networks (800) 473-6745	Access Beyond 1000/BR	Stand-alone	LAN: 2 WAN: 2	2		2		2		2	OSPF, PPP, RIP	✓		✓		✓		✓		$1,495-$1,995
	BRX 5700 Series	Stand-alone	LAN: 1 WAN: 2	1						2	OSPF, PPP, RIP	✓		✓		✓		✓		$3,195-$3,995
Plexcom, Inc. (805) 522-3333	PlexRouter 8029-5	Chassis module	LAN: 2	2							RIP							✓		$1,895-$2,545
Proteon, Inc. (800) 545-7464	Globetrotter 60/62	Stand-alone	LAN: 1 WAN: 1	1		1		1		1	PPP, RIP	✓ (5)				✓ (5)		✓		$795-$995
	Globetrotter 70/72	Stand-alone	LAN: 1 WAN: 1	1					BRI: 1		PPP, RIP	✓ (6)				✓ (6)		✓		$995-$1,195
	RBX 200/205	Stand-alone	LAN: 1 WAN: 2	1	1	2			BRI: 1 (7)	2	OSPF, PPP, RIP	✓	✓	✓		✓		✓		$1,890-$2,790
	RBX 250	Stand-alone	LAN: 2 WAN: 4	2	2	4				4	OSPF, PPP, RIP	✓	✓	✓		✓	✓	✓		$3,795-$4,695
RAD Data Communications (201) 529-1100	Web Ranger	Stand-alone	LAN: 1 WAN: 1	1	1	1	1	1	BRI: 1	1	PPP, RIP, SLIP, other					✓	✓	✓		$990-$1,650
RNS (div. of Meret Communications, Inc.) (800) 262-8023	NetHopper NH-BRI 600 Series	Stand-alone	LAN: 1 WAN: 3	1		1		1	BRI: 2		PPP, RIP					✓		✓		$1,295-$2,795
	NetHopper NH-P Dial-up Router	Stand-alone	LAN: 1 WAN: 1	1				1			PPP, RIP					✓		✓		$1,595
	NetHopper NH-Remote Access Server	Stand-alone	LAN: 1 WAN: 5	1		5		5			PPP, RIP					✓		✓		$1,795-$3,795
	NetHopper NH-Sync+	Stand-alone	LAN: 1 WAN: 2	1		1	1	1			PPP, RIP					✓			✓	$2,195
SBE, Inc. (800) 214-4723	netXpand Central	Stand-alone	LAN: 1 WAN: 10	1		2		10	BRI: 1		PPP, RIP, other					✓		✓		$1,899-$1,899
	netXpand Routeman	Stand-alone	LAN: 4 WAN: 1	4				1	BRI: 1		PPP, RIP, other					✓		✓		$599
	netXpand SoHo	Stand-alone	LAN: 1 WAN: 4	1		2		4	BRI: 4		PPP, RIP, other					✓		✓		$899
Sourcecom Corp. (818) 735-3500	InCarda/I	PC-based	LAN: 1 WAN: 1	1			1			1	PPP, RIP, other					✓		✓		$745-$945
	InCarda/P	PC-based	LAN: 1 WAN: 1	1			1			1	PPP, RIP, other					✓		✓		$1,045-$1,245
	InRoute/Broadband	Stand-alone	LAN: 1 WAN: 1	1			1			1	PPP, RIP, other					✓		✓		$1,995
	InRoute/D	Stand-alone	LAN: 1 WAN: 1	1			1			1	PPP, RIP, other					✓		✓		$795-$995
	InRoute/DL	Stand-alone	LAN: 1 WAN: 1	1			1			1	PPP, RIP, other					✓		✓		$1,495-$1,695
	InRoute/R	Stand-alone	LAN: 1 WAN: 2	1						2	PPP, RIP, other					✓		✓		$1,345-$1,545
Symplex Communications Corp. (313) 995-1555	DirectRoute Remote RO-1	Stand-alone	LAN: 1 WAN: 1	1					BRI: 1		PPP, RIP	✓				✓		✓		$599-$1,399
3Com Corp. (800) 638-3266	SuperStack II NetBuilder	Stand-alone	LAN: 1 WAN: 3	1	1	3	3	3	BRI: 3	3	ISO IS-IS, OSPF, PPP, RIP	✓	✓	✓		✓	✓	✓	✓	$1,595-$4,295
Whittaker Xyplex (800) 338-5316	Network 3000	Stand-alone	LAN: 1 WAN: 10	12		16	2	16	BRI: 2	2	ISO IS-IS, OSPF, PPP, RIP, RIP 2, other	✓		✓		✓		✓		$1,995-$5.195
	RouteRunner	Stand-alone	LAN: 1 WAN: 2	1		1	1	1	BRI: 1	1	PPP, RIP, RIP 2, other	✓				✓		✓		$1,495
	RouteRunner ISDN	Stand-alone	LAN: 1 WAN: 1	1					BRI: 1		PPP, RIP, RIP 2, other					✓		✓		$1,395

Product names highlighted in color were selected for the Short List.

Chart compiled by Kathy Scott

Footnotes:

(1) Can be configured in a DEChub 90/900 or Digital Multistack.

(2) Can be installed in a DEChub 900 hub.

(3) Slot-dependent.

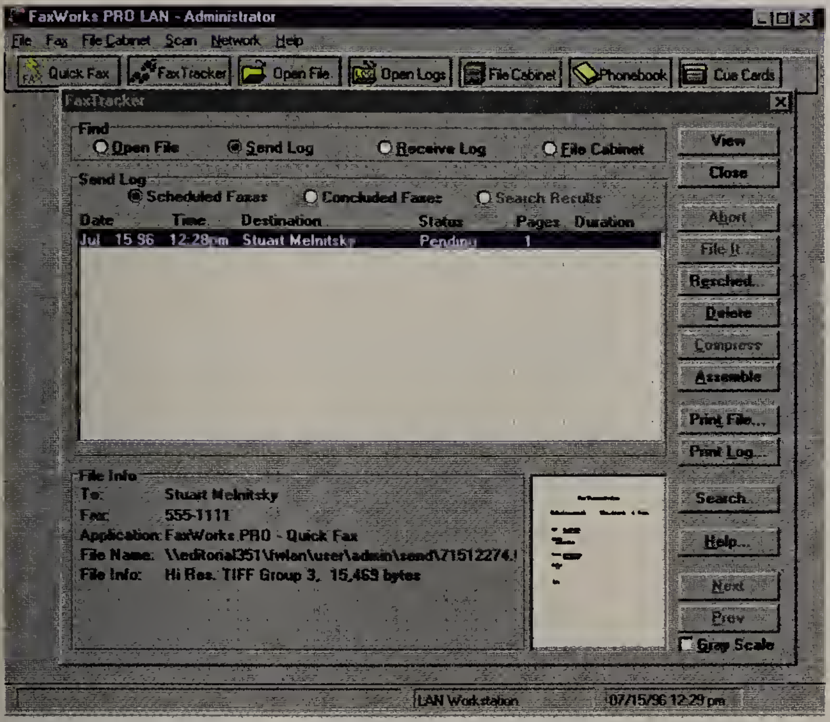
(4) System-dependent.

(5) Globetrotter 62 only.

(6) Globetrotter 72 only.

(7) RBX 205 only.

CLNP = Connectionless network protocol
IS-IS = Intermediate System to Intermediate System
OSPF = Open Shortest Path First
RIP = Routing Information Protocol
XNS = Xerox Network Systems



● Send Log

● Scheduled Faxes

Date	Time	Destination	Status	Pages	Duration
Jul 15 96	12:28pm	Stuart Melnitsky	Pending	1	

To: Stuart Melnitsky
Fax: 555-1111
Application: FaxWorks PRO - Quick Fax
File Name: \\editorial351\fwlan\user\admin\send\71512274.
File Info: Hi Res. TIFF Group 3, 15,469 bytes

☐ Gray Scale

LAN Workstation 07/15/96 12:29 pm

Figure 1: *In the FaxWorks client, the FaxTracker windows let you view the status and file details of an incoming or outgoing fax.*

It's hard to go wrong with any of these fax server options for Windows NT servers

FAXTASTIC!

By Stuart Melnitsky

At the cost of some setup time and hardware, fax servers can save money for most organizations with even moderate inbound and outgoing fax needs. A fax server saves paper, eliminates time spent printing and standing around a separate fax machine, and immeasurably improves the task of broadcasting the same fax to multiple recipients.

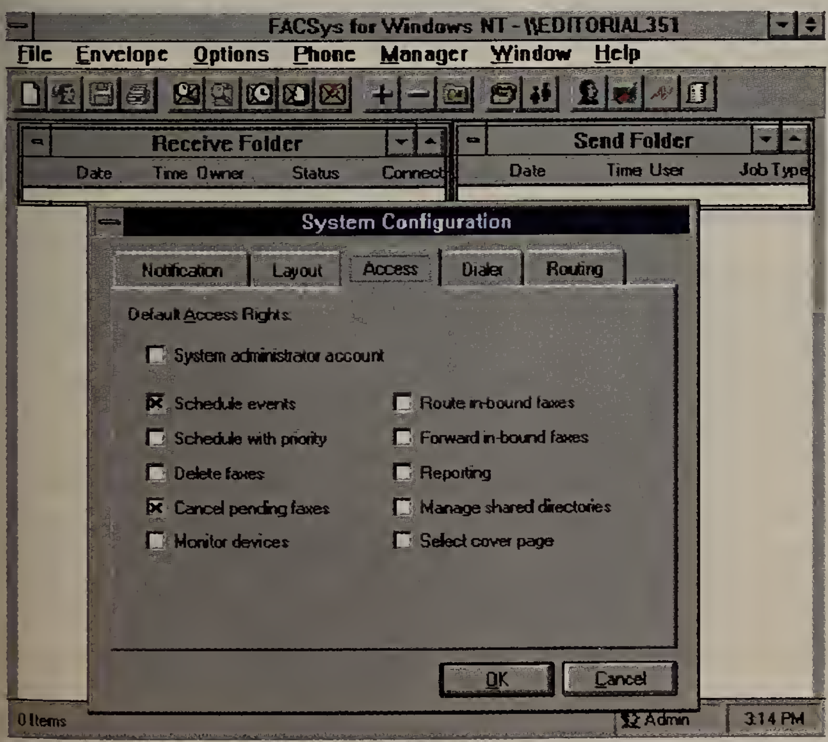
In this installment of a continuing series on fax servers for the enterprise, we tested four fax server solutions that run as services under Windows NT.

RightFAX, Inc.'s eponymously named product edges out its competition ever so slightly with a complete fax arsenal that includes optical character recognition (OCR) capability and E-mail compatibility. Optus Software, Inc.'s FacSys and Global Village Communication, Inc.'s FaxWorks also offer full sets of send and receive features, including inbound routing, customizable cover sheets, private and shared phone books, billing code fields and administration tools.

Trailing the pack is Omtool's Fax Sr. Its feature set is comparatively limited, and its management and user interfaces lack the polish of its competitors' offerings. But it offers a notable feature that the others lack: least cost routing. This option routes faxes between different servers before transmission to minimize the distance and phone charges.

For this review, we asked for products that run as NT services. With the appropriate licenses, you can configure any of these packages to run with multiple fax boards (or modems, if supported), or you can set up a single fax server for several LANs. FaxWorks and RightFAX work only with Brooktrout Technology, Inc.'s fax boards, whereas FacSys' support extends to GammaLink fax boards and WildCard Technologies, Inc. (formerly Intel Corp., formerly Pure Data, Ltd.) SatisFAXtion boards. Fax Sr. supports Brooktrout boards, as well as several external modems.

Three of the four packages offer client components for Windows, Windows 95 and NT workstations. FaxWorks provides client software for Windows only. If you're interested in incorporating OS/2 workstations into your fax environment, you'll need to look at RightFAX.



Default Access Rights:

☐ System administrator account

☒ Schedule events
☐ Schedule with priority
☐ Delete faxes
☒ Cancel pending faxes
☐ Monitor devices
☐ Route in-bound faxes
☐ Forward in-bound faxes
☐ Reporting
☐ Manage shared directories
☐ Select cover page

0 Items Admin 3:14 PM

Figure 2: *FacSys provides a single client interface for both administrators and users. With the appropriate administrative rights, you can configure the software and perform a host of management activities.*

SCORECARD

NetworkWorld BLUE RIBBON WINNER

	FaxWorks	Fax Sr.	FacSys.	RightFAX
Overall score	**7.2**	**6.2**	**7.2**	**7.3**
Send features (25%)	8	7	7	7
Receive features (25%)	7	7	7	8
Server administration (20%)	6	6	7	6
Client ease of use (20%)	8	5	8	8
Installation and documentation (10%)	6	5	7	7

Scores based on a scale of 1–10. Categories are weighted by the percentages shown.

All of the packages offer E-mail gateways, though FaxWorks and RightFAX require that you purchase separate software modules. The packages integrate well with a variety of E-mail transport protocols to allow users to send and receive faxes from within their E-mail packages. All four packages support Microsoft Mail and cc:Mail. FacSys, RightFAX and FaxWorks also work with Lotus Notes and Novell's GroupWise, and FacSys adds support for Message Handling Service (MHS) as well. Fax Sr., likewise, supports Notes and MHS and is the only one of the bunch to support Microsoft's Exchange.

We installed and tested the packages one at a time, always taking care to remove an application from the server before moving on to the next installation. We were disappointed to find that FaxWorks and FacSys do not provide uninstall routines. RightFAX and Fax Sr. do.

Server administration

Optus' FacSys offers the strongest suite of administration tools, but all the packages provide fax server management capabilities that can be accessed from client workstations. We encountered no problems with basic tasks, such as creating and managing users on the network, starting and stopping the server, monitoring fax activity and setting inbound routing schemes.

Global Village's FaxWorks (Figure 1) and Optus' FacSys (Figure 2) combine their user and administration tools in single client programs, requiring that users have the appropriate privileges to access administrative functions. RightFAX (Figure 3, page 50) and Omtool's Fax Sr. (Figure 4, page 52) employ separate administrative programs.

With FacSys, you can perform a host of administrative tasks, ranging from creating and managing a user base to setting up housekeeping routines to delete old faxes. You can also set alerts for FacSys to notify you if the server runs low on disk space, a useful feature not found in the other packages. When you create new users, you can assign as many as 10 access privileges or simply assign administrative rights. Access privileges include assigning priorities to scheduled events, such as fax transmissions; routing, forwarding and deleting faxes; and generating reports.

During installation, RightFAX creates an administrator, which has the privileges to add fax users and assign rights. It was the only package that allowed us to define groups of users, each with its own fax administrator. You can also require users to enter passwords before accessing any fax client services.

RightFAX's administrative client, FaxAdmin, also proved flexible, but fell a little short in the area of automatic fax deletion. Users can choose to have their own faxes deleted automatically after successful transmission, but given the tendency of many users to save rather than delete files and data, relying heavily on this housekeeping approach could be dangerous.

RightFAX does provide a separate command-line utility, Faxage, that deletes faxes based on their age, but administrators would be better served if this function were built into the more polished FaxAdmin application.

Fax Sr.'s System Manager interface provides a little more than the basics, though it lacks polish. You must register users before they can access the fax server, but unlike the other packages, Fax Sr. does not rely on privilege schemes to curtail users' activities.

With System Manager, you can start and stop the server, implement routing schemes, and configure the fax server to notify you via E-mail or network messages of certain events, such as modem timeouts and no answers. You can also set up automated housekeeping routines to ensure that incoming and outgoing faxes are deleted after a specified number of days. System Manager also allows you to create access control tables that restrict users from faxing to certain area codes.

With FaxWorks, you can endow users with four rights — Admin, Server, Router and FaxWorks Pro. Users with Admin rights can log out other users, search, print and export log files, and reschedule fax transmissions. The Server privilege is used to designate a specific computer (identified by a FaxWorks username) as the FaxWorks server. The Router privilege allows a designated user to manually route faxes not routed via one of FaxWorks' automatic routing schemes. Finally, FaxWorks Pro is a basic user right, which, according to Global Village, should be assigned to all users. So, we wonder, why is it an optional setting?

HOW WE DID IT

We installed the four fax servers, as well as a Brooktrout Technology, Inc. TR114-4L fax board, on a Micron Electronics, Inc. 133-MHz Pentium server running Windows NT 3.51 with Service Pack 3. We tested each server by sending text and graphics from a variety of Windows applications, as well as through its fax client interface. We looked at features such as support for attachments, customizable cover pages, billing options and phone book management.

On the receive side, we looked at the manual and automatic inbound routing algorithms, as well as the viewing and forwarding capabilities of each fax client. We also checked out the quality of transmitted documents. Finally, we spent considerable time looking at the administrative capabilities of each package, noting the ease or difficulty associated with configuring the server, creating and managing user bases, setting up routing databases and performing fax cleanup

Like RightFAX, FaxWorks relies on users to clean up after themselves. There is no management utility to delete faxes based on their age. Instead, users can delete faxes — manually or automatically — or make use of a compression routine to conserve space.

The right look

FacSys, FaxWorks and RightFAX employ somewhat similar client interfaces. Send and receive logs contain the incoming and outgoing faxes, and users can employ menus and toolbars to perform faxing tasks. If you run RightFAX on a Windows 3.1 platform, you can make use of a power bar to switch to a fax queue on the fly. This power bar is unavailable for Windows 95 platforms, which means users have to select the fax queue from the print menu in their Windows applications before faxing the document.

Fax Sr.'s interface is functional but not elegant, and not as easy to move through as the other products' interfaces. For instance, the pop-up window provided for viewing our phone books was not wide enough to accommodate our entries, and there was no horizontal scroll bar.

Then there's the cover page designer provided by Omtool, which requires you to enter variables, such as %RECIP—NAME% for recipient's name and %DATE% for date, into your cover sheet designs. This falls far short of the methods offered by the other applications we tested, which allow you to customize existing fax cover page templates without having to use pseudo-programming code.

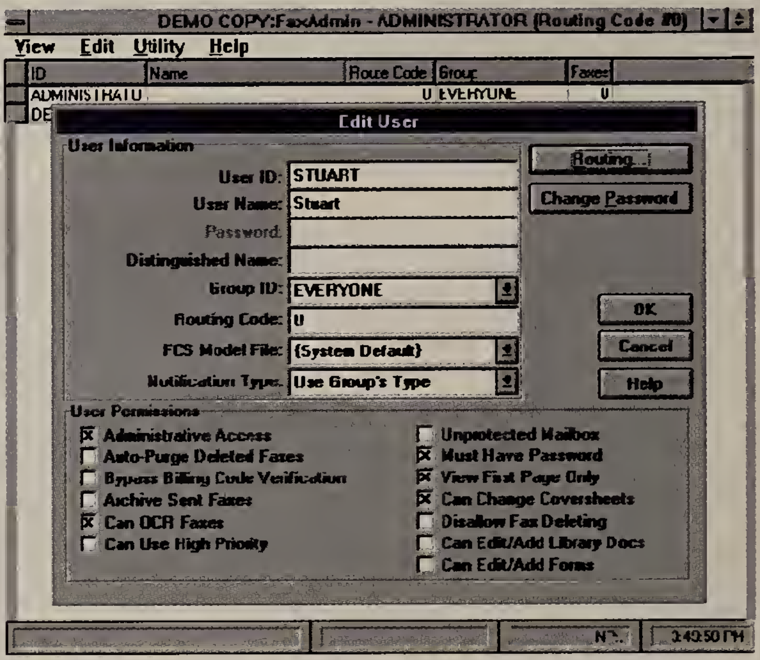
Each package allows users to fax documents from within Windows applications via a printer driver or generate quick faxes from the fax client software. Users can submit faxes for immediate transmission or schedule them for a specific time. You can also include settings that determine how many transmission attempts to make before giving up.

We opened a variety of Windows applications — word processors, spreadsheets, databases and presentation software — and faxed text and graphics without any problems. Each fax server generated high-quality faxes, far superior to the quality of faxes transmitted by standard facsimile machines.

Still, there are a host of other features to consider. And, though each package provides the basics, such as phone books, cover pages and broadcast faxing, there are some differences worth mentioning. Take fax attachments, for instance. With FaxWorks, Global Village does not provide a quick means to attach external files to your faxes when sending from the client interface, but it does offer a nifty feature that allows you to attach scanned documents. FacSys' support for attachments includes ASCII, BMP, PCX, DCX, PCL, PostScript and TIFF, whereas Fax Sr. only supports BMP, PCX and TIFF.

Like FaxWorks, RightFAX supports scanned attachments but does not provide a one-step method for attaching files. Instead, it employs a library as a repository for incoming and outgoing files. The library is intended to store documents you may need to send frequently, such as corporate brochures or phone directories. But by printing any Windows document to the fax queue and then storing it in the library, you can, in effect, create attachments, though in a less-than-direct manner.

You can create and manage one or more phone books with all of these applications, but there are notable differences.



User ID: STUART
User Name: Stuart
Password:
Distinguished Name:
Group ID: EVERYONE
Routing Code: 0
FCS Model File: (System Default)
Notification Type: Use Group's Type

☒ Administrative Access
☐ Auto-Purge Deleted Faxes
☐ Bypass Billing Code Verification
☐ Archive Sent Faxes
☒ Can OCR Faxes
☐ Can Use High Priority
☐ Unprotected Mailbox
☒ Must Have Password
☒ View First Page Only
☒ Can Change Coversheets
☐ Disallow Fax Deleting
☐ Can Edit/Add Library Docs
☐ Can Edit/Add Forms

Figure 3: *RightFAX's administrative client allows you to create and manage fax user bases. You can assign user permissions and restrict the view of manual routers to the first page of incoming faxes.*

FaxWorks, FacSys and Fax Sr. allow you to create individual and shared phone books, which is fine if you can organize your information that way. But RightFAX offers a superior approach, allowing you to maintain private and shared entries in the same phonebook. An entry remains private unless you "publish" it and make it available to other users. With RightFAX, you can change the network availability of an entry much more easily than with the other packages.

There are a few other frills. If you're using FacSys, RightFAX or FaxWorks, you can associate billing codes with your transmissions, thus allowing your organization to track usage. You can export the billing information to a spreadsheet or database application in order to calculate and assess charges. We'd like a way to charge users on a per-page or per-fax transmission. Organizations with more sophisticated needs, however, may yearn for a way to build in real-world tariff tables to assess accurate charges.

Fax Sr. is the only member of this group that provides least cost routing. With least cost routing, you can have faxes routed to another server on the network before transmission to reduce phone charges. Suppose you have a network with server nodes in Boston and New York and you want to fax a document from Massachusetts to New Jersey. Fax Sr. can route the document over the network and send the document from the New York server to take advantage of a lower phone rate. To do this, Fax Sr. must be installed on all routing and receiving servers.

The ins and outs of inbound routing

Fax servers employ several inbound routing schemes, which may allow you to automate the distribution of incoming faxes. One thing to keep in mind, however, is some fax boards and modems may not support specific routing schemes. Here is a brief explanation of the more common inbound routing algorithms:

Calling Station ID (CSI): The identification provided by the sending machine is used to route faxes. For instance, you can have all faxes from a major client routed to a specific account manager.

Direct inward dial (DID): You can have the phone company set up a DID trunk and assign a bank of phone numbers, which you can then assign to users in your organization. When a fax is transmitted to one of these phone numbers, it will be routed to the appropriate individual.

Dual-tone multi-frequency (DTMF): With DTMF, you don't need to involve the phone company. The sender tacks on a four-digit code to the end of the phone number. Once the fax is received, the code is matched against a database to determine where it should be routed. Unfortunately, many fax devices do not support DTMF.

Line routing: All faxes received on a specific phone line are routed to a designated user on the network.

Fax reception

Of course, sending faxes is only half of the story. We also looked at the ability of these servers to receive faxes, focusing on features such as manual and automatic inbound routing, automatic forwarding of faxes to other locations and viewing capabilities. RightFAX and FacSys led the pack in this arena, with solid routing, viewing and forwarding capabilities.

RightFAX's automatic inbound routing schemes include direct inward dial (DID), dual-tone modulation frequency (DTMF) and line routing. If users will be out of the office, they can configure RightFAX to forward faxes to remote fax machines or send them to other users' mailboxes. RightFAX's viewer is pretty versatile, allowing you to manipulate images and insert text annotations.

What sets RightFax apart from the other packages is its OCR routing capabil-

OUR NEW DATA COMPRESSION TECHNOLOGY CAN PUMP NEW LIFE INTO YOUR OLD 56 KBPS SERVICE.

DSU III DBUc

Dedicated DSU with automatic switched back-up Data compression of up to 256kbps on a single 56kbps line. Interoperable with non-compressing DSUs.

If you've been wondering how much longer you can live with 56kbps service, the answer may be "longer than you think." The new data compression technology in our DSU/CSUs (based on the recently announced TIA/EIA 655 specification) can give you up to 256kbps throughput on a single 56kbps line. So you can get more productivity from your DDS service, or save on Switched 56 charges by moving your data through faster. The ADTRAN DSU IIIc family of compressing DSUs is also fully compatible with existing non-compressing DDS and Switched 56 products. If your 56kbps service is dying from overwork, give it a new lease on life. Call us, or access our World Wide Web home page at http://www.adtran.com. **1-800-326-3700, ext.** 284

ADTRAN

DSU III S4Wc

DSU III ARc

DSU III DBUc

WE KNOW DIGITAL TRANSMISSION INSIDE AND OUT

©1995 ADTRAN, Inc. 901 Explorer Boulevard, Huntsville, Alabama 35806 2807

*Circle Reader Service #***43**

ity. If you've purchased and installed the OCR module, you can set RightFAX to automatically convert the first page of incoming faxes and search for words associated with users' fax mailboxes — usually the recipient's name. When it finds a match, it routes the document. If it doesn't find a match, it places the document in a default mailbox where it awaits manual routing.

This works as you'd expect, but there's no intelligence built in. When the program finds a word that matches a database entry — "Brown," for instance — it can route the document accordingly. If there are 10 Browns in the organization, you may need more precise database entries.

Once documents have been routed, users can view them, or, if the OCR module has been installed, convert them to text. We tested the OCR capability with a variety of documents and were quite impressed. Though not perfect, it converted many of our documents — even a heavily formatted resume — quickly, efficiently and fairly accurately. You can save the OCR output in ASCII or rich text format.

For details of our experience with vendor support of the Brooktrout fax board, select NetRef, Buyer's Guides and Reviews, then NT Fax Servers.

NetworkWorld Fusion
http://www.nwfusion.com

FacSys supports DID, DTMF and line routing, as well as manual routing by designated users. Like RightFAX, it can be set up to forward a user's faxes to another fax machine or route it to another fax user on the network.

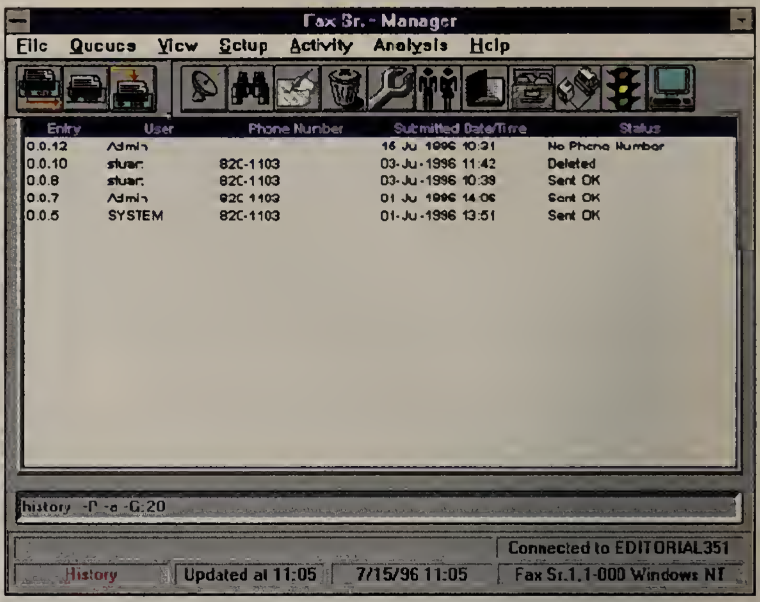
In addition to providing all of the necessary image manipulation features, FacSys' viewer provides a helpful set of annotation tools for adding notes and highlighting areas of a fax.

When it comes to receiving faxes, FaxWorks is adequate but lacks some useful features, such as tools for annotating or marking up faxes.

Still, FaxWorks has its strengths. It supports automatic DID and DTMF inbound routing, as well as manual routing. It also has built-in OCR capability, which worked pretty well during our testing, though it didn't perform as well as RightFAX when converting our heavily formatted resume test document. Like RightFAX and FacSys, FaxWorks allows users to forward their faxes automatically to another fax number.

Fax Sr.'s strength is its automatic inbound routing capabilities. In addition to supporting DID, DTMF and Calling Station ID routing, Fax Sr. can be configured for voice-assisted DTMF routing. When this is enabled, callers hear a prerecorded message that provides instructions for using DTMF routing. They can then enter a DTMF code. The fax server maintains a database of DTMF codes — one entry for each user on the network. When a fax is received with the DTMF code, the fax server finds the matching DTMF code in the database and routes the fax to the appropriate user.

Unfortunately, Fax Sr. falls short in other areas, such as manual routing. There is no quick and easy method for designating users who have routing privileges. Instead, you must install the Fax Sr. Cover Page Router on a specific PC and establish a file service connection to the NT server. The obvious drawback to this approach is that routing privileges are tied to the PC on which the software is installed rather than to a specific user. Fax Sr.'s viewer also proved disappointing. The images of our test documents, though readable, were often distorted, and the image manipulation tools are rudimentary at best. There are no annotation or markup tools.



```
Entry    User     Phone Number   Submitted Date/Time   Status
0.0.12   Admin                   16 Ju 1996 10:31      No Phone Number
0.0.10   stuar.   820-1103       03-Ju-1996 11:42      Deleted
0.0.8    stuar.   820-1103       03-Ju-1996 10:39      Sent OK
0.0.7    Admin    820 1103       01 Ju 1996 14:06      Sent OK
0.0.5    SYSTEM   820-1103       01-Ju-1996 13:51      Sent OK
```

```
history -P -a -G:20
```

```
                                          Connected to EDITORIAL351
History   Updated at 11:05   7/15/96 11:05   Fax Sr.1.1-000 Windows NT
```

Figure 4: *Fax Sr.'s client interface lacks some polish, but it has most of the basics. You cannot view incoming and outgoing fax logs simultaneously.*

As for security, FaxWorks and RightFAX can be configured such that those charged with routing faxes can see only the first page, presumably the cover page. FaxWorks goes a step further, and can be configured to disallow self-routing, thus preventing manual routers from viewing an otherwise restricted fax.

File management

Even when running smoothly, fax servers pose a major challenge for enterprise network managers: conserving disk space. Each of these products provides the necessary tools for deleting faxes. Of course, that's not always enough, which is why some of the packages provide administrative housekeeping to ensure that disk space is periodically cleared.

Of the pack, Fax Sr. includes the strongest housekeeping capabilities. It's the only one of the bunch that allows you to set up automated cleanup routines to delete faxes, based on criteria such as the number of days to keep outgoing and incoming faxes.

FacSys offers a nifty notification feature that alerts you when disk space usage reaches a specified level. Then as the administrator, you can delete four categories of faxes from send and receive folders — faxes that have been sent successfully, those that failed, faxes that have been read and faxes that have been in the folder for more than a specified number of days. Unfortunately, you must perform this cleanup manually; there is no way to schedule FacSys to delete faxes automatically.

RightFAX and FaxWorks provide no inherent administrative housekeeping, though RightFAX does offer a separate command-driven utility called Faxage to delete old faxes. FaxWorks relies on users to delete their own faxes, but offers a compression feature to reduce disk space consumption.

All of these packages are well-suited to midsize workgroups, though you should carefully consider the features and capabilities that differentiate them. If you're looking to automate document handling functions, the built-in OCR capabilities of FaxWorks and RightFAX should be appealing.

If you place a premium on cost, then the least cost routing feature of Fax Sr. may make it worth living with, despite its rather rough client interface. But if centralizing administration is key, you should take a good look at FacSys, with its administrative client that allows you to automate a number of housekeeping chores.

NetResults

Product	**FaxWorks Pro LAN Windows NT 3.0**	**Fax Sr. 1.1**	**FacSys Fax Messaging Gateway for Windows NT 4.10**	**RightFAX NT 4.5**
Vendor	Global Village Communication, Inc. (770) 984-9958 www.globalvillage.com	Omtool (800) 886-7845 (603) 898-8900 www.omtool.com	Optus Software, Inc. (908) 271-9568 www.facsys.com	RightFAX, Inc. (520) 327-1357 www.rightfax.com
Price	10 users: $1,595 30 users: $2,495 E-mail: $995	25 users: $2,495 Unlimited users: $4,995	Server: $995 Client: $30-$45 (depending on number)	Single-channel unlimited users: $1,495 Additional lines: $795 OCR: $1,295 E-mail: $1,295
Client Support	Windows 3.1 or Windows for Workgroups 3.11 (will run on Windows 95)	DOS, Macintosh Windows/Windows for Workgroups (requires Win32s), Windows NT and Windows 95	Windows 3.1/Windows for Workgroups 3.11, Windows NT and Windows 95	OS/2, Windows 3.1/Windows for Workgroups 3.11, Windows NT, and Windows 95
Pros	▲ Cover-page-only routing feature ▲ Self-routing can be disabled ▲ Supports scanned file attachments	▲ Least cost routing ▲ Automated cleanup routine ▲ Supports several inbound routing schemes	▲ Solid server administration capabilities ▲ Supports several inbound routing schemes	▲ Supports scanned file attachments ▲ Supports several inbound routing schemes
Cons	▼ Supports only Brooktrout fax boards ▼ No fax markup or annotation tools	▼ No billing code option ▼ Rough client interface	▼ No cover-page-only option for manual routing	▼ No built-in administrative cleanup routine (separate command-driven utility) ▼ Supports only Brooktrout fax boards

World TEST ALLIANCE

The alliance is a cooperative of users, consultants, educators and integrators that applies its technical and business skills to analyze and compare strategic network products. A list of alliance partners can be found on page 41.

Melnitsky is an independent networking consultant and analyst in Arlington, Mass. He can be reached at sm@world.std.com.

Management Strategies

Covering: Career Insights and Innovations
in Managing Staff, Budgets and Technology

Briefs

■ *The* **Women in Cable & Telecommunications Foundation** *will offer the first of three career planning seminars Sept. 5-6 in Atlanta and Nov. 7-8 in Chicago.* **Career Strategies Seminar I: Managing Your Own Career** *is designed to help attendees define personal and professional goals and assess how those goals fit into the context of company goals.*

The seminar will also help participants develop a better understanding of personal skills and how to optimize them for career advancement.

The cost is $295.

Women in Cable & Telecommunications Foundation: (312) 634-2359.

■ **Computer Sciences Corp.** *recently announced it signed a 10-year, $40 million outsourcing deal with* **Montgomery Kone, Inc.,** *a Moline, Ill.-based elevator company.*

Under the outsourcing contract, Computer Sciences will provide mainframe operation, desktop support, network management, a help desk and application maintenance for 194 Montgomery Kone branch offices and service sites, 22 international distribution points and five manufacturing facilities throughout the U.S.

CSC: (310) 615-0311.

■ **Xylan Corp.** *is offering a free half-day seminar titled* **Virtual LANs Don't Work. . . UNLESS** *in cities throughout the U.S. and Canada from Aug. 27 to Dec. 11.*

The seminar will focus on Fast Ethernet and ATM as options for the workgroup and global enterprise.

It will also address how virtual LANs can improve switched network performance, the differences between VLANs and ATM emulated LANs, the types of VLANs available today and strategies for building and interconnecting them.

Xylan: (800) 932-0024.

Integrate testing into network projects

Good testing procedures will increase your odds of successful systems and network integration projects.

By James Carlini

Users embarking on strategic network implementation projects are beginning to realize they cannot afford half-baked testing procedures that fail to root out the bugs before they become blood-sucking monsters on operational budgets.

However, some executives and consultants view testing as window dressing instead of an integral part of a project.

ONLINE

For more on setting up a good testing program, visit Network World Fusion. Select Careers, then Integrate testing into project plans.

Network World Fusion
http://www.nwfusion.com

You should convince these executives and consultants that testing is a multistep process that has to ensure success before a project is completed. It cannot be a single-level acceptance test or an arbitrary testing scheme that covers single elements of an overall network or a single vendor's products.

Indeed, the use of multivendor equipment and multicomponent systems in today's networks requires testing at various stages in the project. This effort should be overseen by a strong testing and certification team that is independent of the project development and implementation team.

This testing and certification group should include people that understand the technologies being implemented or have a broad systems background that they can apply to developing various test scenarios.

The team's first action is to familiarize itself with the implementation project, and assess any existing testing procedures.

From this assessment, the team can determine what needs to be added to or improved in the existing testing procedures to meet the needs of this particular project. The team then prioritizes its tasks and suggests changes to enhance the network in development or nip a problem in the bud.

There is a seven-step process that the test team can use when modeling its plan of attack (see graphic). The premise of the process is quite simple: Testing complexity at each stage increases exponentially until you have proven that the integrated systems and net technology work as designed.

Seven-level testing

Here's an idea of who should be included in testing, the tasks they need to accomplish and the relative complexity they will encounter at each level. Note that complexity can quadruple at each level until the most complex testing is done at the integration level.

Level	Participants	Task	Complexity
Component	Vendor, test team	Make sure each product works	Simple
Subsystem	Vendors, test team	Make sure two or more products can work together (for example, a PC and modem)	Difficult
System	Vendors, test team, user group	Make sure all subsystems work as one	More difficult
Application	Vendors, test team, multiple user groups	Make sure users or computer processes in each user group can interact with one another	Very difficult
Integration	Vendors, systems integrators, test team, multiple user groups	Make sure that all components, subsystems, systems and applications have been seamlessly linked	Most difficult
Stress testing	Vendors, test team, user groups	Make sure the network does not fail before hitting a specified threshold	Simple
Acceptance and certification	Vendors, test team, organization footing the bill	Make sure everything works as promised and no avoidable surprises are forthcoming	Simple

SOURCE: CARLINI & ASSOCIATES, INC., HINSDALE, ILL.

That complexity then decreases until there is certification that everything functions properly.

The seven levels

Testing is very simple at the component level because you are usually examining one product from one vendor.

This amounts to testing each component in the project to ensure that it functions properly out of the box — for example, turning on a modem to make sure it gets juice and starting up a PC to make sure it boots correctly.

Things get a little more complicated at the subsystem level because you are testing to see how two different products from the same or different vendors work together. For instance, making sure a PC and modem work together.

At the system level, testing gets more complex because now you have multiple products from multiple vendors.

End users of the system are a significant addition to the picture at this level.

For example, you've added a printer to the PC and modem pairing, loaded lots of software on the PC and now need to see that end users are able to navigate the system without running into problems.

Testing complexity takes another exponential jump at the application level.

Now that network drivers and LAN connections have been added to multiple vendor PCs, you've got to make sure end users from multiple departments can share data and exchange messages while still being able to dial up connections as needed.

The most complex testing comes at the integration level. Everything and everybody has to work perfectly as a unit by now. More end users have been added, plus processes and applications on various systems have been merged.

Once everything passes the integration level with flying colors, testing complexity diminishes as evidenced by what needs to be accomplished at the stress testing level.

Here, the system is exposed to heavy traffic, a high number of transactions or whatever else might cause it to croak.

Finally, the certification level is as simple as making sure that everything works.

Quality assurance is no doubt a complex undertaking. But it is worth the effort to avoid being stuck with a network that is up, but only sometimes running.

Carlini is president of Carlini & Associates, Inc., a Hinsdale, Ill.-based international consulting firm, and can be reached at (630) 986-1888 or via the Internet at carlini@nwu.edu.

When testing fails

To illustrate what can go wrong when proper testing is overlooked, consider what happened at an aluminum processing plant that wanted to use an overhead monorail system and bar coding to deliver tubs of scrap to their destinations.

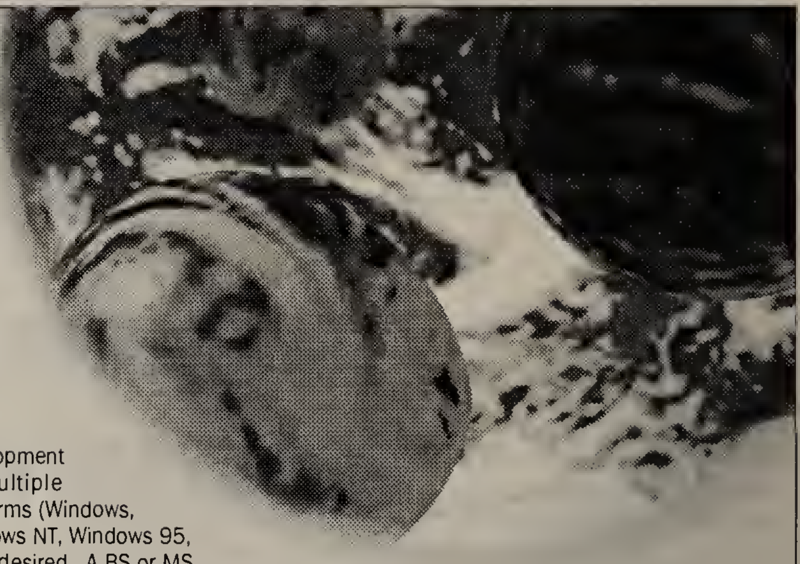
The tubs were to be scanned by a bar code reader as they passed particular points on the monorail. The scanner would read the tub's code and tell the monorail on which track it belonged.

When the system was tested, the tubs were empty. The scanners read the bar codes well and the monorail put tubs on the correct tracks.

However, it seems there was no stress testing done because once the tubs started carrying the metal, the added weight brought the bar code on the side of the tub below the scanner. The result was that tubs crashed into one another because the scanner could not read the bar codes, which in turn meant that the monorail could not put them on the right track.

Executing a stress test would have avoided this.

—James Carlini



Something awe inspiring is happening behind the scenes.

Enough business as usual. The old ways of communicating are quickly giving way to some very exciting new ones. You can make it happen at Microsoft by developing easier ways for people to share information and get things done. Opportunities now exist in our **Windows NT, Exchange, Microsoft News Network, and Internet Platform and Tools Group** for a variety of positions:

PROGRAM MANAGER
Internet Platform and Tools Group
As a member of the **Internet Services Business Unit**, your primary responsibilities will include designing protocols and software for multicast HTTP on the Internet. Qualifications should include a minimum of 3 years of experience as a project leader in an Internet environment. Experience with protocol design, HTTP, DNS, RTP/RTCP, Windows, Windows NT, and Internet client and server applications preferred. Detailed knowledge of TCP/IP and Windows architecture required. Familiarity with the IETF and demonstrated ability to supervise staff and meet deadlines preferred. A BS or MS degree in Computer Science or related technical discipline preferred.

NETWORK ENGINEER
The Microsoft Network
As a member of the **MSN** Operations team, you will be responsible for diagnosing network routing, authentication and name resolution problems for Microsoft Network (MSN) customers; configuring routers and network management systems in a global, multi-protocol network; insuring real time monitoring and alarm capability for network devices; providing periodic 7x24 on-call support; and assisting in the evaluation and lab testing of new equipment, protocols, tools and network services. A minimum of 5 years' experience in Data/Telecommunications industry in a network operations role. Must be skilled at using packet sniffers and an expert at router configuration and protocols. Familiarity with async modems, and a detailed knowledge of the Internet and its protocols and operation required. A BS degree in Computer Science or Electrical Engineering preferred.

SOFTWARE DESIGN ENGINEER
Desktop and Business Systems
As a member of the **Windows NT** development team, you will be responsible for enhancing various components which are part of the TCP/IP suite of protocols. This includes working on the TCP/IP stack itself and applications such as Telnet, FTP, IPR/LPD, DNS, RSH, and REXEC. A minimum of 2 years demonstrated programming experience in C and a strong familiarity with TCP/IP and related protocols a must. Demonstrated ability and interest in developing systems level software and knowledge of operating systems principles is essential. A BS or MS degree in Computer Science required.

SOFTWARE DESIGN ENGINEER
Desktop and Business Systems
As a member of the **Exchange** development team, your responsibilities will include working on the message transfer and storage for the Exchange Server. This includes working with key people owning other components of Exchange (client, server and MAPI layer) to track problems and do performance optimizations for client/server interactions. Demonstrated experience in client/server design and implementation, as well as strong Windows application design and development experience required. Multithreaded and client/server programming experience with OLE and Win32 APIs preferred. Skills in programming methodologies involving code core development for multiple platforms (Windows, Windows NT, Windows 95, MAC) desired. A BS or MS degree in Computer Science or a related technical discipline is required.

SOFTWARE DESIGN ENGINEER
Internet Platform and Tools
As a member of the **Normandy** development team, you will be responsible for designing and developing software for distributed security for Normandy which includes the areas of remote authentication, distributed access control, encryption, electronic billing and large scale private/public key infrastructure design. A strong networking and distributed security background with preferably NT programming experience. A BS or MS degree in Computer Science or related technical discipline preferred.

Think you've got what it takes to work for the world's most progressive, most dynamic software company. Mail your resume to: **MICROSOFT CORPORATION, Attn: Recruiting Dept. Ad8h5-0826, One Microsoft Way, STE 303, Redmond, WA 98052-8303.** Or, e-mail in ASCII text format to: **resume@microsoft.com (Indicate Dept. Ad8h5-0826 in the subject header).** No phone calls, please. We are an equal opportunity employer and support workforce diversity.

Microsoft Recruiting will be present at Networld + Interop 96. If you're interested in talking with a recruiter at the conference, forward your resume to wwwjob@microsoft.com For more information, see our http://www.microsoft.com/jobs/.

http://www.microsoft.com/jobs/

Microsoft is a registered trademark and *Where Do You Want To Go Today?* is a trademark of Microsoft Corporation.

Microsoft®
Where do you want to go today?

CTI
ATM
NETWORK MGT & SECURITY
EMERGING INTERNETS
SWITCHED INTERNET & HIGH SP LANS
WIRELESS MEDIA & TRANSMISSION

Network World's Career Fair
at
NetWorld+Interop '96 Atlanta
Georgia World Congress Center
September 18 - 20, 1996

Why Should Your Company Exhibit?

Because...

...the six themes of the NetWorld+Interop '96 Atlanta Show are the hottest technologies and most in demand today

...50,000+ network computing professionals with an interest in and knowledge of these six areas are expected at the NetWorld+Interop show at the Georgia World Congress Center

...you're too smart to pass-up a great opportunity to hire the best network computing professionals at a great price

For details on packages available call Pam Valentinas at 1-800-622-1108 or email: pamval@nww.com

Increase LAN Performance at Intel's Network Products Division.

Opportunities at Intel in Oregon

Intel's Network Products Division (NPD) develops remote LAN access solutions, end-to-end network management products and best of class network adapters. This solutions-oriented division in Portland, Oregon has Engineering, Manufacturing and Marketing opportunities for professionals who take a proactive approach to high-bandwidth networking and communications challenges.

All positions require a minimum of a BS degree and 3+ years' related experience. MS preferred for many of the positions.

Engineering

Software/Hardware Engineering Program Manager

Lead teams of HW/SW engineers in new product development and sustaining efforts supporting Intel's LAN adapter products. Requires product planning and supervisory experience, as well as a background in PC HW/SW development.

Program Manager

Program management experience with complex silicon, board-level HW/SW product development in emerging markets is required. Must be versed in all project related tools.

Software Engineers – Embedded System Programming

Must have working knowledge of Ethernet LANs, hubs and/or switches and SNMP management standards. Knowledge must include embedded system programming using C/C++ and/or Assembly languages. ICE and debugger knowledge essential.

Software Evaluation Engineers

Must have experience designing, developing, and debugging test procedures and suites for LAN adapters, repeaters, and/or switches. Knowledge of LANs and the ability to set up PC workstations and servers for NetWare, Win NT/95 and Windows for Workgroup environments required. Experience writing SW automation test scripts essential.

Software Engineer – UNIX Drivers

Develop and debug UNIX driver programs for both retail and OEM markets. Requires the ability to plan, design and debug driver software. Familiarity with device drivers in UNIX essential.

Software Engineer – Network Adapter Drivers

Requires experience developing and/or testing network adapter drivers. The ability to develop code in C and Assembly languages and a HW background with network controllers are key.

Sr. Engineering Manager

You'll be involved with networking HW/SW development. Requires a background in PC HW/SW development.

Hardware Engineer – Fast Ethernet Board Design

Develop network interface boards throughout all design phases. Proven ability to design and develop board-level products, digital/analog design skills, and knowledge of data communications, including LANs, are required.

System Hardware Engineer

Requires ASIC, FPGA, VHDL and high speed digital design skills. Experience leading a team of engineers through the product development cycle a must. Design experience with LANs essential.

Sr. Human Factors Engineer

Be a key player in the development of our network management projects. Must be familiar with all phases of analysis and have strong PC skills.

Engineering Software QA Manager

Requires experience managing a software evaluation, testing or QA organization. Knowledge of software evaluation techniques and quality methodology essential.

UNIX Software Evaluation Engineers

Requires knowledge of UNIX, as well as experience with test development and device drivers.

Software Technician

Familiarity with quality software development is required. Experience creating MS DOS batch files or high level programming experience preferred.

Marketing

Technical Marketing Engineers

Drive major account sales and marketing activities in the growing OEM segment. Must understand LAN technology and the networking industry. Strong communication and presentation skills a must.

Marketing Project Manager

Responsible for marketing, retail and PR programs for Intel's newly-announced Video Phone with Intel ProShare™ technology. Computer retail channel and retail marketing programs knowledge is key.

Product Marketing Managers

Responsible for all phases of the marketing process for a product line. Requires knowledge of the networking industry, including network management software. Product marketing and/or strategic marketing experience imperative.

Switch Product Marketing Engineer

You'll provide product marketing ownership for the Intel Express Switch products. Requires marketing experience in the networking market. Excellent communication and presentation skills, including knowledge of graphical presentation packages are essential.

Product Marketing Engineers

Develop marketing requirements documents and marketing plans, and perform market research. Requires knowledge of the networking industry, as well as strong presentation, communication and planning abilities.

Manufacturing

Customer Program Managers

Provide product management support for all manufacturing aspects of new and sustained product lines. Requires a solid understanding of manufacturing operations in a retail or branded products business environment.

Test Engineers

Must possess C programming experience; DOS and Windows literacy; PC bus, system, PB and electronic design knowledge; and strong problem solving skills.

Manufacturing Engineers

Ensure product design manufacturability, cost and quality targets are met. Utilize your SMT manufacturing experience. Must have strong DFM, problem solving and project/time management skills.

Utah Opportunities

Opportunities are also available in Salt Lake City in software engineering, program management, technical marketing and technical support. E-mail your ASCII text resume to **utah_staffing@ccm.ut.intel.com**

Intel offers excellent salaries and benefits that include employee profit sharing, stock ownership plans, tuition reimbursement, periodic paid sabbaticals and relocation assistance. Here in the Northwest, you'll find the quality of life that disappeared long ago in other areas – affordable housing, clear air, and year 'round activities.

Join Intel in Oregon.

Please e-mail your ASCII text resume to **michelle_hedy@ccm.jf.intel.com**, referencing Dept. O833, or mail your letter quality resume to our central electronic resume processing center: Intel Corporation, Oregon Opportunities, Staffing Dept. O833, P.O. Box 1141, FM3-145, Folsom, CA 95763-1141. For more information about these and other opportunities with Intel, visit our WWW server at: http://www.intel.com

intel®

All trademarks are registered to their respective companies. The Intel logo is a registered trademark, and ProShare is a trademark of Intel Corporation. Intel Corporation is an equal opportunity employer and fully supports affirmative action practices. Intel also supports a drug-free workplace and requires that all offers of employment be contingent on satisfactory pre-employment drug test results.

NETWORK SYSTEMS SALES • PRE- & POST-SALES ENGINEERS

Do You Have the Vision?

While other companies are selling legacy hardware, **MAXNET** evaluates, deploys and supports emerging network technologies from multiple manufacturers, and builds the most advanced network systems available for our customers. **MAXNET's** product and service offering evolves with technology. Our sales and engineering teams continually expand their expertise to build and support progressive network systems.

The **MAXNET** Advantage. . .

- Manufacturer-Independent
- State-of-the-art Network Control Center and Interoperability Lab
- Proof-of-technology program
- Engineering-driven company
- Focus on customer service
- Highest-level manufacturer certifications
- Nationwide customer base

MAXNET's core technology focus includes: LANs/WANs/MANs, ATM, SNA, Frame Relay, Remote Access and LAN Switching

MAXNET is seeking talented people with the vision to market and support next-generation network systems.

NETWORK SYSTEMS SALES

Experienced sales professionals needed to sell networking products and services. Rapid growth demands expansion in our New York, Washington D.C., Atlanta, Boston and Florida territories. Previous systems sales preferred, along with excellent written communication and presentation skills. Base salary plus performance incentives make your earnings unlimited.

PRE- AND POST-SALES ENGINEERS

Both pre- and post-sales positions available in Charlotte, Washington D.C., Atlanta, New York, Boston and existing offices along the east coast. Both require 3+ years experience in pre/post-sale support role for enterprise networks, and expertise in LANs/WANs/MANs, ATM, SNA, Frame Relay, Remote Access and LAN Switching. Presentation and writing skills are a MUST. Project management experience is a plus.

Qualified applicants, please send resume to **MAXNET, Dept. NW-EY, 225 East Dania Beach Blvd., Dania, Florida 33004.** EOE.

MAXNET™
communication systems, inc.

Solutions for enterprise networking

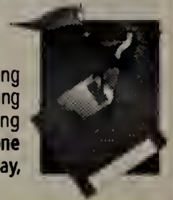
VOTED AS ONE OF THE TOP 25 PLACES TO WORK

MIS/TECH SUPPORT PROFESSIONALS
IMMEDIATE OPPORTUNITIES IN CLEARWATER!

Tech Data Corporation is much more than one of the world's fastest growing and most successful distributors of personal computer products. As a Fortune 500 company, you will enjoy outstanding growth and promotional opportunity. We recently received the prestigious honor of being listed among the Top 25 in *ComputerWorld's Top 100 Places To Work* annual issue.

Join us at our Corporate Headquarters in beautiful Clearwater, where you will be a short drive from sparkling Gulf Coast beaches, unlimited recreational events and all of the conveniences the city of Tampa has to offer. *For additional information on current openings, please see our website at http://www.techdata.com.*

TECH SUPPORT



- **Pre-Sales Network Engineers** - To develop and grow the sales of functioning vendors' product lines by promoting product awareness and providing pre-sales technical support to Sales, Support and customers. Responsibilities also include performing system diagrams, proposals and training. Some travel (20%) may be required to perform/receive training and attend trade shows and other marketing events. Requires 5 years of in-depth technical experience with PCs, high-end servers, LAN/WAN, and associated components. CNE or equivalent certification desirable. An Engineering Bachelor's degree or equivalent work experience in sales/system engineering and/or marketing experience a plus. Opportunities are currently available in the following areas: Bay Networks, CLARiiON, Digital PC, Eicon, Novell, Seagate, and US Robotics. **Code OS-PSN-JC.**
- **Software, Hardware and Network Support Technicians** - To provide pre and post-sales technical software, hardware and networking product support in a call center environment. Requires 2-5 years experience supporting PCs and associated components, including LAN configurations; 2 years computer service experience; and a knowledge of Windows-based applications. In addition to supporting 30,000 different PC-related products, our Technicians receive vendor-sponsored training on a weekly basis. For an immediate telephone interview for these opportunities only, we encourage you to **APPLY BY PHONE BY CALLING (800) 749-4500, ext. 6723, 24 hours a day, 7 days a week.** Or fax/mail resume to us at the information listed at the bottom of this ad. **Code NW-ST-JC.**

MIS

- **Disaster Recovery Analyst** - To develop/maintain an MIS business recovery plan. Requires 5 years experience as a Business Recovery Analyst, Disaster Recovery Analyst or Recovery Planner in a large IBM mainframe environment; thorough knowledge of IBM MVS/XA and ESA operating system/hardware; and knowledge of networking environments (data and voice). CDRP (Certified Disaster Recovery Planner) certification preferred. **Code OS-DRA-JR.**
- **Database Administrator** - Requires skill in SQL Server v6 and/or Sybase v10, Windows NT and/or Unix platforms, stored procedure and SQL programming, and performing monitoring/tuning, and database modeling/design. **Code NW-MDBA-JR.**
- **Micro Application Developer** - Requires 2 years C++ and Windows Client/Server development experience. Skills in VB 4.0, OLE, Object Oriented design, and SQL6.0/6.5 also necessary. Knowledge of Windows 3.X, 95 and NT; SourceSafe; and MFC (Microsoft Foundation Classes) desirable. **Code NW-TDOD-JR.**

In addition to a world of opportunity, you will enjoy competitive compensation and comprehensive benefits. For consideration, please e-mail your information, salary requirements, and job code (in ASCII or text format indicating job code on subject line) to td@ta.hodes.com or forward your resume indicating job code to: TECH DATA CORPORATION, Human Resources, 5301 Tech Data Drive, Clearwater, FL 34620, fax (813) 538-7054. Pre-employment drug testing required. EOE M/F/D/V.

Tech Data®
CORPORATION

NetworkWorld
http://www.nwfusion.com

For More Information
on Advertising
in Networking Careers
Contact Pam Valentinas
1-800-622-1108

Programmer Analyst: For Business Accountability Project, implement SAP R/3 integrated software for accounts receivable module. Major tasks include: analyze data and conversion requirements, develop data extracts and FTP scripts, and test and prepare documentation. Position requires B.S. in Computer Science or related field and two years prior experience as a Programmer Analyst including experience with (1) IBM mainframes utilizing TSO/ISPF, COBOL II and JCL tools; and (2) UNIX operating system with TCP/IP and FTP tools. 40 hrs/wk; 8:00am-5:00pm; salary of $45,000.00/yr. Send resume with Social Security No. to Indiana Dept. of Workforce Development, 10 N. Senate Ave., Indianapolis, IN 46204-2277, Attention: Gene R. Replogle. Include ID#3379769 with response. Applicants must be eligible for permanent employment in the United States.

DON'T MISS THESE GREAT ADVERTISING OPPORTUNITIES IN SEPTEMBER

ISSUE	SPECIAL FEATURE	BONUS DISTRIBUTION	SPACE CLOSE
9/9/96	INTRANET MAG.	NETWORLD WORLD UNPLUGGED - Boston,Ma ICE/INTERNET SOLUTIONS Anaheim, CA	8/28/96
9/16/96	BUYER'S GUIDE: ATM	NETWORLD+INTEROP Atlanta, GA NETWORK WORLD CAREER FAIR TCA - San Diego, CA	 9/4/96
9/23/96	ANNUAL SALARY SURVEY		9/11/96

For more information or to place an advertisement, please call Pam Valentinas at 1-800-622-1108.

NETWORK ENGINEERS

Our employee friendly direct marketing firm is looking for energetic, service-oriented individuals to join our growing Long Island, NY staff. These positions are responsible for design, implementation and support of our enterprise-wide network. You must have 3 years, of extensive Novell network integration and administration experience and a college degree in Computer Science. We offer an excellent benefits package, technical training and professional growth opportunities -- all in close proximity to NYC. Send your resume and cover letter with salary history to:

Human Resources -- LB
PUBLISHERS CLEARING HOUSE
382 Channel Drive
Port Washington, NY 11050
Or e-mail resume as text attachment to:
103440.2172@compuserve.com

EOE M/F/D/V
PCH IS COMMITTED TO A DIVERSE WORKFORCE

Technical Manager

Will coordinate technical liaison services between management, production department, sales department, and customers with newly developed techniques or practices in processing company products, and to inform customers of new types, specifications, and end-uses of products. Confer with R&D and manufacturing affiliates of parent corporation on matters of monitor and motherboard design and production problems, product features, compatibility testing and performance evaluation. Arrange product technical transfer and return merchandise procedures with factory. Supervise technical support and repair departments. Must be familiar with Unix Operating System, SunOS Solaris, PC system board design, Novell Netware 3.X, and Windows environments. Must be fluent in English and Mandarin Chinese. M.S. in Computer Science and 3 years experience in job offered or 3 years experience in related occupation of research and design of computer hardware and software. $36,000 per year, 40 hour week, 8:30 AM to 5:00 PM. Please send resume to: Job Service of Florida, 701 SW 27th Ave., Rm. 47, Miami, FL 33135-3014 Re: Job order # FL-1476165.

Systems Support Analyst: Manage and maintain Local Area Network; write programs in Visual Basic for Excel and Word; install, repair, and upgrade software programs and hardware; train employees to operate accounting software packages. Position requires bachelor's degree in Computer Science. Bachelor's program must include one course in accounting and, in completing bachelor's degree, must have gained experience with C and Assembly programming languages and Excellerator and Paradox database languages. 40 hrs/wk; 8am-5pm; salary of $26,000.00/yr. Send resume with Social Security No. to Indiana Dept. of Workforce Development, 10 N Senate Ave., Indianapolis, IN 46204-2277, Attn: Sean M. Blancaneaux. Include ID#3379746 with response. Applicants must be eligible for permanent employment in the United States.

Arch Communications, a leader in the wireless communications industry, is currently seeking

communication specialists

with experience in the design, development and support of LAN/WAN systems. Experience with Windows NT is a plus. We offer an excellent benefit package and salary commensurate with experience. Please send resume and salary history in confidence to Arch Communications Data Center, 11300 Cornell Park Drive, Suite 200, Cincinnati, Ohio 45242, Attention: HR Rep - CS1.

ARCH

FAX YOUR COPY................

It's easy to place your Recruitment Ad in the Networking Careers Section. Just fax your copy to us at 508-820-0607 and we will typeset it for you at different sizes & prices. No obligation of course.

When we fax it back to you, just call us with your changes and suggestions.

We look forward to working with you.

................TO 508-820-0607

TRAINING VIDEOS

Learn from the Experts

CASEY MCNEAL
GroupWiise Expert

TIM GENOREAU
CNI/Networking Expert

REEO JACOBSON
Visual Basic Author/Expert

JASON HELMICK
CNI & MCT

NEW

NetWare® Certification Videos

NetWare CNA 3.x
- 3.x Administration (508) 7 Tapes $559

NetWare CNE 3.x
- 3.x Administration (508) 7 Tapes $559
- 3.x Adv. Admin. (518) 3 Tapes $239
- 3.x Install & Config (802) 1 Tape $79.95
- 3.x to 4.1 Update (526) 5 Tapes $399

3.x Complete CNE 3.x Training
- (course 508, 518, 802, 526)16 Tapes $995

NetWare CNA 4.1
- 4.1 Administration (520) 5 Tapes $399

NetWare 4.1 Target Training
- 4.1 Install & Config (804) 2 Tape $159
- 4.1 Target Train (520, 804) 7 Tapes $559

NetWare 4.1 Update for Test
- 3.x to 4.1 Update (526) 5 Tapes $399

Novell NetWare Training
These NetWare Certification Series' will help you prepere for the required Novell CNA end CNE Exams.

NEW

Windows NT® MCSE Videos

NT Workstation
- Architecture & Installation
- Booting & Configuration
- Registry, Security, & Users
- Mng. Files, Printers & Apps
- Networking Concepts
- NT Perform. & Trouble Shoot
- Special—All 6 $379.00

NT Server
- Features & Installation
- Domain & Replication
- Groups & Trust Relationships
- Clients & Hetero Networking
- Integrat. Mac, Upgrade & Opt.
- Special—All 5 $319.00
- Special—All 11 +KIT $859.00

Windows NT MCSE Training
This complete Windows NT Certification series will help you prepare for the MCSE Exam. These fulfill two operating system requirements in the MCP Program.
$859.00—11 TAPE BUNOLE & MS PRESS NT TRAINING KIT

30 Day Money Back Guarantee

CALL NOW TO ORDER VISA MasterCard AMERICAN EXPRESS

1·800·865·0165

LearnKey.

SOURCE CODE #48

All company names and/or products are trademarks and/or registered trademarks of their respective holders.

Reader Service No. 275

Marketplace

The Hub of the Network Buy

Free Product Information

To receive more information circle the reader service numbers of products that interest you.

Send this coupon to: Network World P.O. Box 5090, Pittsfield, MA 01203 or Fax (413) 637-4343, or use the prepaid card elsewhere in the issue.

Expires 11/25/96

Name: ________________

Title: ________________

Company: ________________

Phone: (   ) ________________

Street: ________________

City: ________________

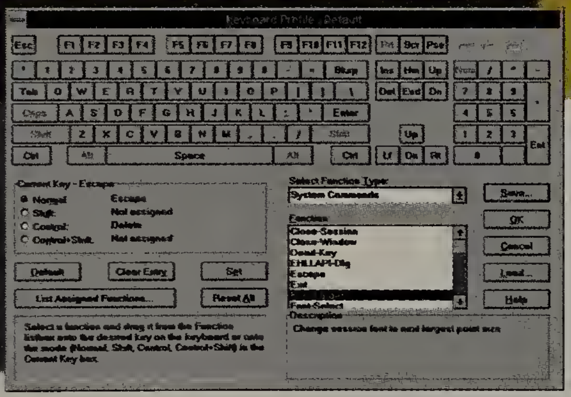
State: ________ Zip: ________

217	218	219	220	221	222	223
224	225	226	227	228	229	230
231	232	233	234	235	236	237
238	239	240	241	242	243	244
245	246	247	248	249	250	251
252	253	254	255	256	257	258
259	260	261	262	263	264	265
266	267	268	269	270	271	272
273	274	275	276	277	278	279
280	281	282	283	284	285	286
287	288	289	290	291	292	293
294	295	296	297	298	299	300
301	302	303	304	305	306	307
308	309	310	311	312	313	314

8/26/96

Distinct IntelliTerm™

Integrated Terminal Emulator for DEC and IBM® Systems



Highlights:

- TN3270 Emulation-Models 2,3,4 and 5 (for IBM Mainframes)
- 3179G Vector Graphics & 3279S3G
- TN5250 (24x80, 27x132) (for AS/400)
- VT52, VT100, VT220, VT320 & VT420 emulation (for DEC and UNIX Systems)
- Customizable keyboard layouts, poppads and session profiles
- VBA™ Advanced Scripting Language
- DDE, HLLAPI, EHLLAPI, WinHLLAPI and Visual Basic™
- Available for Windows 3.11, Windows 95 and Windows NT

Free Evaluation Copy Available at...

distinct®
The world leader in Internet development tools.

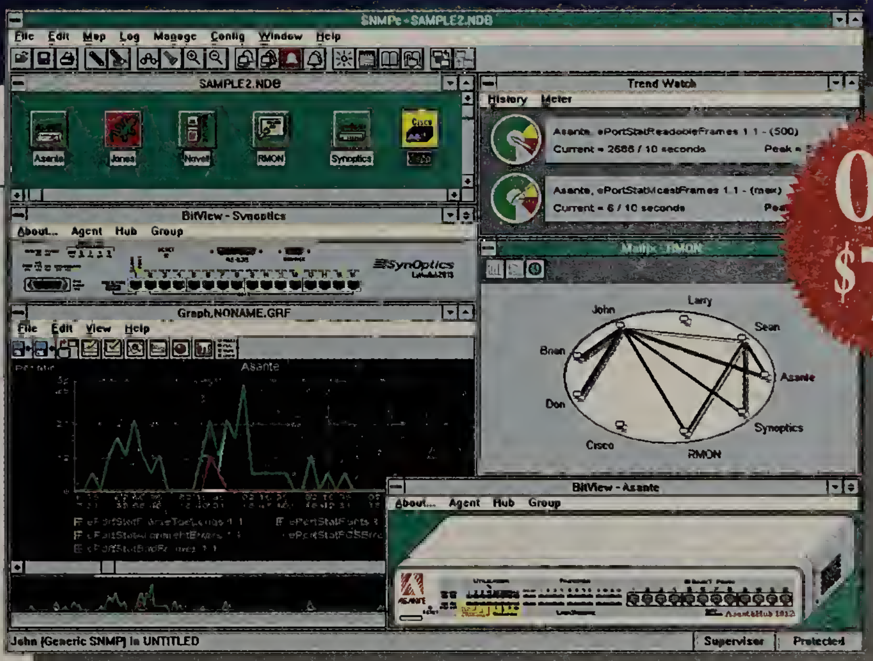
408.366.8933
WWW: http://www.distinct.com
Fax: 408.366.0153
E-mail: networkw@distinct.com
Fastfacts: 408.366.2101

Distinct is a registered trademark and Distinct IntelliTerm is trademarks of the Distinct Corporation. Copyright 1996 Distinct Corporation, 12900 Saratoga Avenue, Saratoga, CA 95070 IBM and Windows are registered trademarks of the respective corporations. All rights reserved. Specifications and terms are subject to change without notice.

Reader Service No. 273

SNMPc

Network Manager for Windows



Only $795

- Full RMON Support
- Integrates with HP OpenView
- TCP/IP, Telnet, TFTP, BOOTP
- WinSNMP/WinSock/DDE APIs
- SNMP, ICMP, IPX Polling
- Node Discovery
- Long Term Statistics/Thresholds
- Custom Event Actions/Forwarding
- Over 100 Device Specific GUIs
- MIB Compiler/Browser

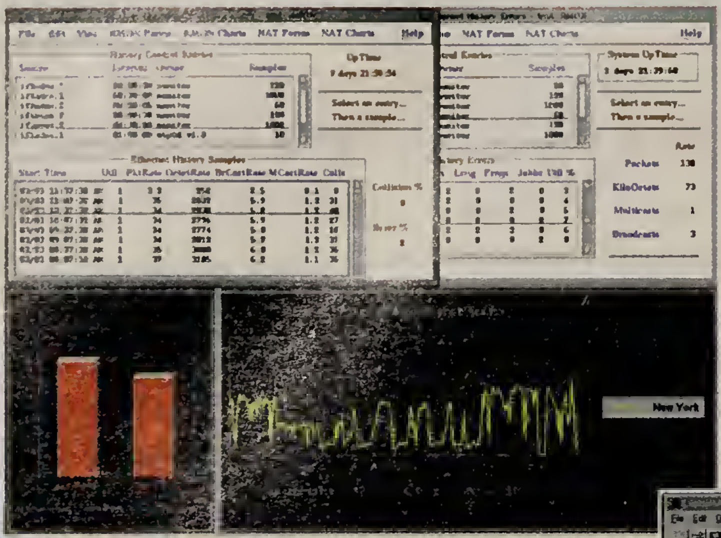
Castle Rock Computing

408-366-6540
Fax: 408-252-2379

Reader Service No. 252

Network Monitoring applications

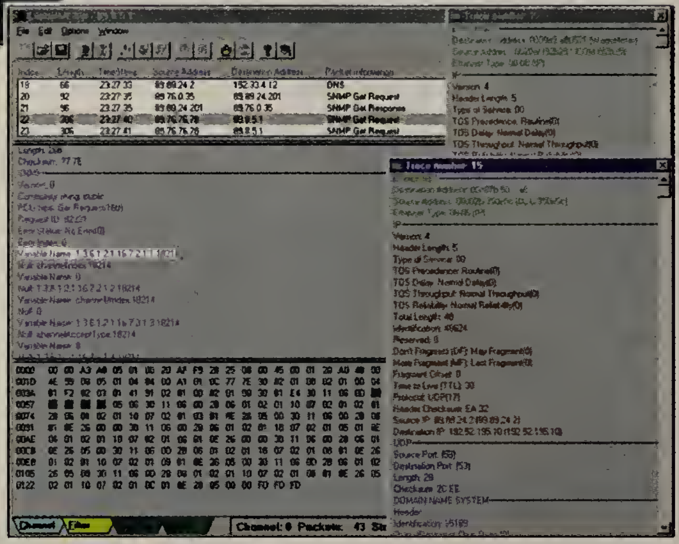
for Windows 95/NT or UNIX

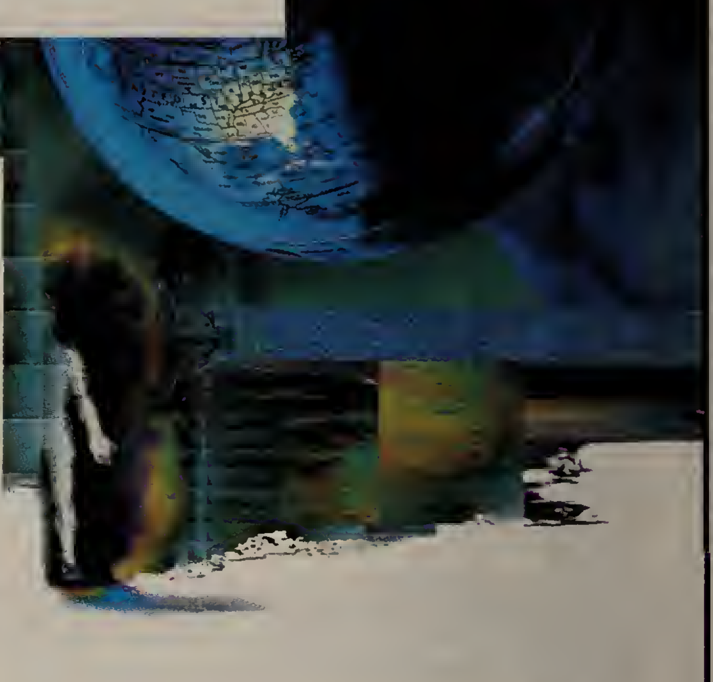


Technically Elite's Network Monitoring application "MeterWare" is a network monitoring application designed for ease of use. MeterWare for Windows 95/NT or UNIX together with our EtherMeter, TokenMeter or FDDI network probes provides a complete solution for monitoring and managing LANs from any geographic location.

Features include

- RMON support for Monitoring Ethernet, Token Ring and FDDI LANs
- Remote Protocol Analysis and Decode
- Multiple Concurrent Data Captures
- MIB Compiler and MIB Browser
- Real-time Statistics
- Daily/Weekly or User Defined Reports
- Grade of Service Reporting
- Baselining/Zooming
- User Definable Alarms
- Graphical User Interface
- Capacity Planning





1.800.474.7888

e-mail: sales@tecelite.com

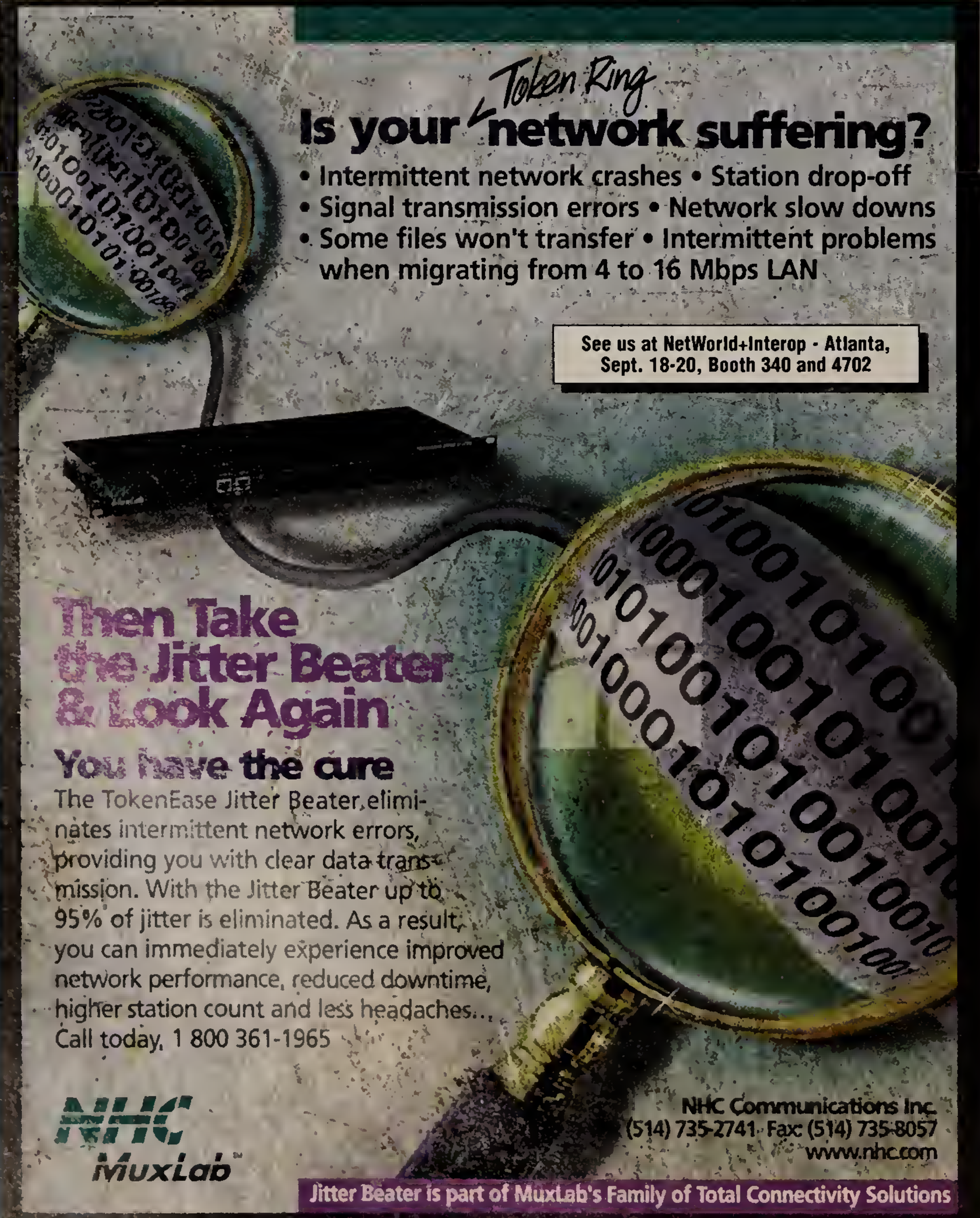
All trademarks and trade names are the property of their respective holders.

Visit our new web site at http://www.tecelite.com

Technically Elite

monitoring your enterprise

Reader Service No. 247



Is your Token Ring network suffering?

- Intermittent network crashes • Station drop-off
- Signal transmission errors • Network slow downs
- Some files won't transfer • Intermittent problems when migrating from 4 to 16 Mbps LAN

See us at NetWorld+Interop - Atlanta, Sept. 18-20, Booth 340 and 4702

Then Take the Jitter Beater & Look Again

You have the cure

The TokenEase Jitter Beater eliminates intermittent network errors, providing you with clear data transmission. With the Jitter Beater up to 95% of jitter is eliminated. As a result, you can immediately experience improved network performance, reduced downtime, higher station count and less headaches...

Call today, 1 800 361-1965

NHC
MuxLab™

NHC Communications Inc.
(514) 735-2741 Fax: (514) 735-8057
www.nhc.com

Jitter Beater is part of MuxLab's Family of Total Connectivity Solutions

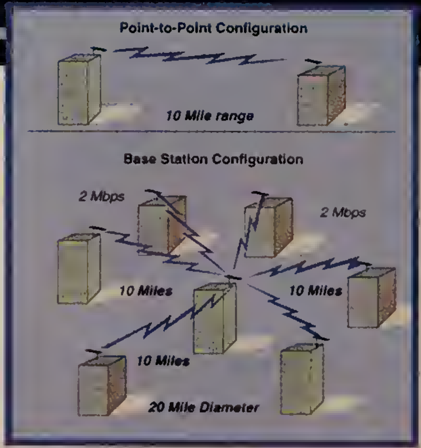
Reader Service No. 281

OverLAN®

Wireless Bridge/IP Router

Extended Range
Local / Campus Area
Network Bridge

NETWORK COMPUTING EDITOR'S CHOICE



OverLAN® Wireless Bridge/IP Router provides a high-speed wireless link between two or more remote LANs up to ten miles apart. Now you can avoid leased line charges and get 40% faster throughput than T1 circuits. In a test of six wireless bridges conducted at Syracuse University by *Network Computing*, the OverLAN® Wireless Bridge/IP Router was preferred overall on its technical merits. The OverLAN® Wireless Bridge/IP Router is packed with features for ease-of-installation and outstanding performance. For detailed specifications, visit our home page - or call, fax, or e-mail us.

C-SPEC Corporation

Phone 1 (800) GO C-SPEC

20 Marco Lane • Dayton, Ohio 45458 • Phone: (513) 439-2882 • FAX (513) 439-2358
http://www.c-spec.com/c-spec • sales@c-spec.com

OverLAN® is a registered trademark of C-SPEC Corporation

Reader Service No. 287

100 Mbps Fast Ethernet and Ethernet Switches

Special Promotional Bundle

Intel WorkGroup Solution

One Intel Switching Hub (ES100TX)	
Three Intel Twelve-Port Stackable Hub (EC100TX)	
Thirty Intel 10/100 32-Bit PCI Adapters (PILA8465B)	
Total Cost for Bundle	$9,795 (Expires 9/30/96)

10/100 Ethernet Switches

INTEL

Express Switching Hub, Five Switched 100Base-TX Ports (ES100TX)	$3,690

BAY NETWORKS

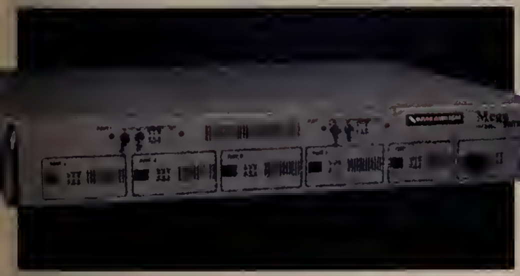
Bay Network Lattis Switch System
Fast Ethernet Switching Hubs

10/100 Mbps UTP Switch,16 RJ45 Supports 10/100 Mbps Ethernet, Mode (28115)	$12,360

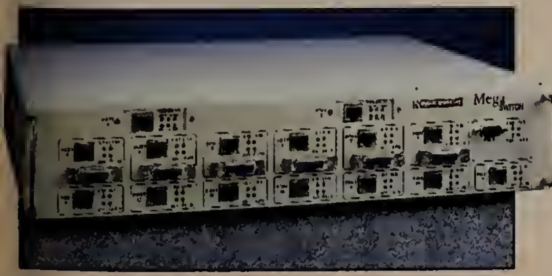
100Mbps *Fiber Optic* Switching Hub (28104)	$14,950

NBASE

MegaSwitch FO Five 100Base-FX Ports (NH2007FO)	$6,455
New MegaSwitch, Five 100Base-TX Ports, Plus Two Expansion Slots for 100Base-TX/FX (NH2007)	$4,450



MegaSwitch Six AUI/RJ45 Ports, Pre-Configured with One 100Base-TX Port NH200MP, and SNMP (NH208-10)	$3,695
MegaSwitch Six AUI/RJ45, Plus Seven RJ45 Ports, Pre-Configured with One 100Base-TX Port NH200MP, and SNMP (NH215-10)	$5,863



100 Base-TX MegaPort Module for NH208/215 (NH200MP)	$1,129

CISCO SYSTEMS

PROStack EtherSwitch Stackable Ethernet Switch, Sixteen RJ45,Two Expansion Slots for High-Speed Modules, 100Base-TX/ATM (CPW1601A)	$3,935
(CPW1601B)	$4,582
100Base-T module for PRO16,1 RJ45 (CPW100T)	$972
EtherSwitch 1200, Twenty-Five 10Base-T Ports, Two 100Base-TX,1K MAC (CPW1200)	$5,359
EtherSwitch 1400, Twenty-Five 10Base-T, Two Slots 8K MAC (CPW1402)	$5,740
One-Port 100Base-TX Module (CPW1411-X)	$686
Eight-Port 100BaseTX Module (CPW1418-X)	$1,695

3COM

LinkSwitch 1000, Twenty-Four Switched 10Mbps Port, One 100 Base-TX Fast Port (3C16900)	$3,445
LinkSwitch 1000, Twelve Switched 10Mbps Ports, One 100Base-TX Fast Port(3C16901)	$2,645

LinkSwitch 3000, Five Switched Fiber SC 100Base-FX Ports, One Switched copper 100Base-TX Port (3C16940)	$7,525
LinkSwitch 3000, Eight Switched 100Base-TX Ports (3C16941)	$5,575

ASANTE

Fast 10/100 Bridge, Integrate 100Mbps Fast Ethernet to Existing 10Mbps Ethernet	$969
Ready Switch Four 10Base-T Ports, One 100Base-TX Port with SNMP	$2,049

100 Mbps Fast Ethernet Adapters

INTEL

Ether Express PRO/100 32-bit (PILA8465)	$159
Ether Express 10/100 PCI (PILA8465B) Single/5PK/20PK	$132/580/1995
Ether Express PRO/100 32-bit EISA (EILA8265)	$235

Intel EtherExpress PRO/100 LAN Adapter
Give your Pentium processor-based PC's the network bandwidth they deserve.
intel

New Intel Smart 100 Nitro High Performance Server Adapter(PILA8485)	$715

3COM

10/100 PCI (3C595TX) Single/5PK	$169/754
10/100 EISA (3C597-TX)Single/5PK	$251/1228

COGENT

PCI Quartel,Full Duplex,4RJ45 Ports (EM400)	$1,137
10/100 PCI (EM110TX)	$190
10/100 PCI (EM440)	$1,170
10/100 ISA (EM110TX) Single/5PK	$195/924

SMC

10/100 EISA (SMC923DST)	$240
10/100 PCI (SMC933DST)	$194

ASANTE

10/100 PCI Adapter for PC and MAC	$187

100VG AnyLAN Adapter

KATRON

100VG ISA Adapter (DP-161)	$149
100 VG EISA Adapter (DP-32E)	$192

HEWLETT PACKARD

100VG 16-bit ISA 10/100 (J2573A HP) Single/6PK	$170/985
100VG 32-bit EISA (J2577A HP) Single/6PK	$227/1,319
100VG 32-bit PCI (J2585A HP) Single/6PK	$166/890

100Mbps FX Adapter

COGENT

PCI-SC Connector (EM100)	$499
PCI-ST Connector (EM100FX)	$499
Eight-Port Fast FX Hub (S-800)	$3,285

FDDI Adapters

NETWORK PERIPHERAL

SAS PCI Singlemode (NP-PCI-S50)	$599
SAS PCI Multimode (NP-PCI-S10)	$995
DAS PCI Multimode (NP-PCI-D10)	$1,360

100 Base-TX Fast Ethernet Hubs

INTEL

Express Stackable Hub, Twelve 100Base-TX Ports Stackable up to Six Units (EC100TX)	$1,485

NBASE

100Base-TX Eight-Port Hub (NH108)	$1,425

NETWORTH

100Base-TX Eight-Port Hub (MICRO100)	$1,350
Dual Speed Fast Ethernet Hub Twenty Four-Port (MICRO10/100)	$3,565

SMC

Tiger Hub 100 Sixteen-Port 100Base-TX Hub (SMC5116TX)	$2,398

D-LINK

100 Base-TX Twelve-Port Hub (DFE-812TX)	$1,342

ASANTE

100 Base-TX Twelve-Port Stackable Hub	$1,545

BAY NETWORKS

Twelve-Port 100Mbps Hub (AT2202-001)	$1,740

3COM

100 Base-TX 12-Port Stackable Hub (3C250-TX/1)	$1,949

100Base-T4

Fast Ethernet with CAT 3 UTP Support

COGENT

10/100 PCI (EM110T4)	$190
12-Port Stackable T4 Hub (S-1200)	$1,590

100 VG AnyLAN Hubs

KATRON

100VG-AnyLAN Hub, 6-Port/12-Port (DP1006/DP1012)	$840/1,330

HEWLETT PACKARD

Advanced Stack 100VG 15-Port Hub, Stackable up to 16 Hubs (J2410A)	$1,835

100Mbps Macintosh

FARALLON

Fast Ether TX-10/100 NuBus (PN990)	$328
Fast Ether TX-10/100 PCI (PN994)	$240

ASANTE

Fast 10/100 NuBus(99-00-364-00)	$299

ATM

Efficient Networks

155.52Mbps PCI ATM Adapter with 512K Memory (ENI-155P-MF-C)	$1,200

NBASE

Multimode to Singlemode ATM Converter, 20KM Single Link (Node Attach) (N420ATMI)	$3,995

Fibre Channel - The ATM Alternative

ANCOR COMMUNICATIONS

Gigabit Fibre Channel, 1.0625 Gigabaud per Channel, Sixteen-Port FCS1062 Fibre Switch	$46,797
FCS1062 PCI Adapter	$3,273

Ethernet, FDDI, Token Ring LAN Interface Modules Available

Internet & Remote LAN Access Products

ADTRAN

T1 DSU/CSU, V.35 Dte N1-24, T1 and Fractional, B8ZS/AMI, SF/ESF Framing	$1,390
TSU-T1,1200-.060 L1 Data Channel DSU/CSU	$995

ASCEND

PipeLine 25 ISDN Bridge, IP/IPX Routing, Compression, Built-in NT! (P25-1URTRCOF)	$999
PipeLine 50 ISDN Bridge, IP/IPX Routing, Compression, Built-in NT1	$1,020

PROTEON

RBX205 Router, One Ethernet, Two WAN, ISDN with IP/IPX S/W	$2,605
Globetrotter 100 Remote Access Router, Four-Port Ethernet LAN Repeater, Two WAN Serial Ports with IP/IPX	$1,555

3COM

NetBuilder Remote Office 422, ISDN Access Super Stack Router, IP and IPX (3C8422)	$2,699

ACC SYSTEMS

Nile Branch Office Bridge/Router with IP/IPX, AppleTalk, One RJ45 LAN Port, One ISDN BRI, One V.35 Port	$2,445

BAT

SU 56K DDS, Point to Point or Multipoint, DSU/CSU,V.35 InterFace, Front Panel LEDs	$425

CISCO SYSTEMS

2501-IP Router, One Ether Port, Two Serial Ports, Dial on Demand	Call For Prices
2503-ISDN IP Router, One Ether Port, Two Serial Ports, ISDN BRI Demand	Call For Prices

Ethernet Network Adapters

WEST HILLS

ISA BNC (ENET16C)	$35
ISA RJ45 (ENET16T)	$35

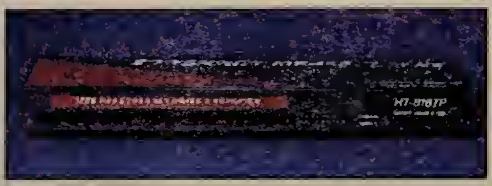
ISA RJ45/BNC (ENET16CT)	$39
RJ45/BNC/AUI (HT2100PCI+PCI)	$69
RJ45/BNC/AUI (HT2100VL VLB)	$69

For SMC,3Com, and Intel Ethernet Adapters -Please Call

Hubs

WEST HILLS

Eight-Port 10BT Hub, BNC & AUI Ports (HT08TP)	$110
Sixteen-Port 10BT Hub, BNC & AUI Ports (HT16TP)	$235



Sixteen-Port 10BT Smart Hub, AUI Ports (UE2041)	$290

Transceivers

AUI to TP	$39
AUI to BNC	$39
AUI to 10Base-FL	$249
AUI to MultiMode Fiber (1300nm,5Km)	$449
AUI to SingleMode Fiber (1300nm,10Km)	$549

Fast Ethernet Guide

Switched and Fast Ethernet, How It Works and How to Use It, The Only Book Dedicated to The Latest in Ethernet Networking Technology	$39

Receive Your Free Copy With The Purchase Of Any Switch or 100Mbps Hub

Visa & MasterCard • Fast Delivery • Most Orders Ship The Same Day • Prices Subject To Change Without Notice

NBASE COMMUNICATIONS
North Hills • Galcom • NBase Switch

ASANTÉ

Bay Networks

WEST HILLS
LAN SYSTEMS
7949 Woodley Avenue, Van Nuys, CA 91406
1-800-FOR-LANS
1-800-367-5267
Technical Support: 818-773-8171 • Fax: 1-818-773-8932

Reader Service No. 297

3Com

intel

ciscopro

With all these features, our T1 Channel Bank should look like this.

The **Access Bank II T1 Multiplexer** easily links remote offices, provides digital Internet access up to 50 times faster than today's fastest modems, and helps you access competitive long-distance services—**with a pay back in months, not years.**

- Dual T1 interfaces
- High-speed digital data ports (up to 1.5Mbps)
- Drop and insert
- Protection switching/route diversity
- Digital cross connect
- Up to 24 analog voice lines

Call now to get high performance, feature-filled, low cost T1 Access!

1-800-495-5455

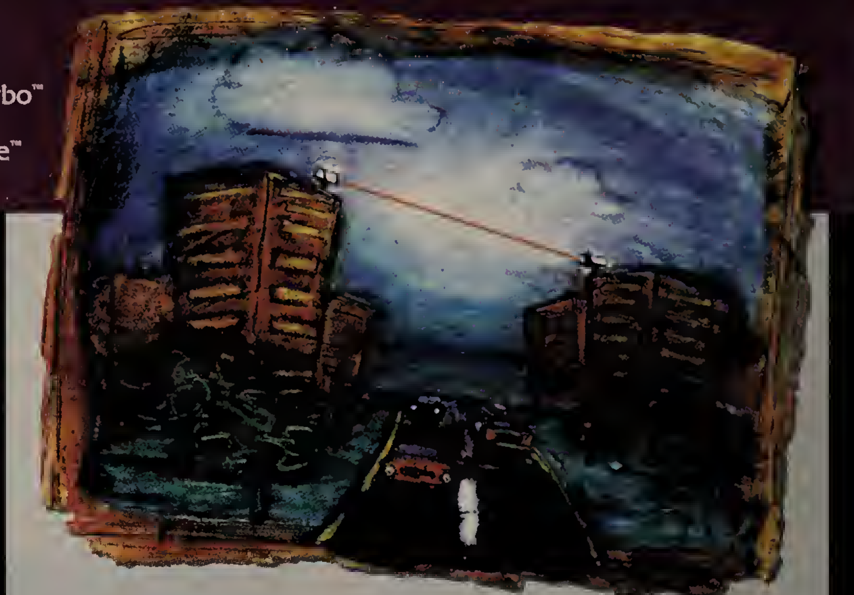
Please visit Carrier Access at
http://www.carrieraccess.com

CARRIER ACCESS™ CORPORATION
5395 Pearl Parkway, Boulder, Colorado 80301

Reader Service No. 251

WIRE-SPEED 10 TO 155MBPS

Freespace™
FreespaceTurbo™
FreespaceLite™



BEST OF LAN TIMES 1995

WINNER Data Communications LAN Times BEST OF SHOW 1995 ATLANTA

INTERNETWORK

The award-winning Freespace laser link delivers wire-speed building-to-building connectivity at distances up to 1000ft. (300 meters). Cost-effective and easily installed, Freespace bridges the gap when traditional solutions like fiber are unavailable – and T-1 lines just aren't fast enough.

The Freespace family includes:

- Freespace Turbo for ATM, FDDI, and Fast Ethernet connections.
- FreespaceLite for an economical Ethernet link.
- A multiplexed Freespace solution integrating Ethernet with up to 4 T-1 voice lines.

Designed for all weather conditions, Freespace is your interbuilding solution for short-range, wire-speed connectivity.

Call us, fax us, or visit us at http://www.silcomtech.com

SILCOM

Freespace, Freespace Turbo and FreespaceLite are trademarked names of SilCom Manufacturing Technology Inc.

North America 1-800-388-3807
Tel: (905) 238-8822 Fax: (905) 238-4976

Reader Service No. 269

SPARCstation™ 10 performance for only $550?

Rave Computer, the exclusive distributor of Weitek's SPARC POWER uP Chip has drastically reduced prices!

SPARCstation™ 10 performance!

SPARCstation™ 2, IPX® upgrade

Weitek's 80MHz SPARC POWER™ uP Chip:
100% compatible with all versions of Solaris®, easy to install, SunService warranty, twice your SPARCstation processing power.

Easy to Install • Upgrades • Trade-ins
Quantity discounts available!

Rave Computer Association, Inc.

36960 Metro Court • Sterling Heights, MI 48312
Fax: (810) 939-7431 • E-Mail: info@rave.com
Internet: http://www.rave.net

1-800-966-7283

RIDE THE WAVE RAVE SAVE WITH RAVE

WEITEK

Reader Service No. 302

A remote access router, FRAD, data compressor and a DDS CSU/DSU you can upgrade to T-1...

All in one box. You won't find a package that's easier to install !

None of the hassles of connecting and maintaining all those separate devices. And, with the powerful Eastern Research SpanNet router, it's an easy upgrade when you're ready to go from DDS to T-1 and/or add a second WAN port.

The SNMP-managed SpanNet router supports IP/IPX routing and concurrent spanning tree bridging. It uses the industry-standard Stac algorithm for data compression and includes frame relay support, a dial back-up port, V.54 diagnostics, a built-in BERT and flash memory. All for only $1495 with a V.35 interface, $1795 with a DDS CSU/DSU or $1995 with a T-1 CSU.

For more information on SpanNet Routers and other unique Eastern Research products, call 800-337-4374 or write Eastern Research, 225 Executive Drive, Moorestown, NJ, 08057.

Eastern Research
Products as Solutions

Reader Service No. 225

To get a One-Stop Intranet Solution, You've got to press the right buttons.

1·800·929·3054

Finally, a simple solution for creating and managing an Intranet. Intranet Genie™ is versatile, scalable, and affordable. It provides robust client and server applications, a secure remote administration interface, and our advanced CyberSearch™ capabilities for finding information on your network and independent databases. You can be up and running in less than a day! ■ Install Wizards make setup a breeze! ■ Secure SuperWeb™ Server and Client authentication and encryption (SSL v2 and v3) ■ S/MIME Email and POP3 Mail Server and Client ■ WYSIWYG HTML Editor, Image Map Editor ■ HTML Document Converter ■ Workflow Application Tools ■ Connectivity for TCP/IP and IPX Networks ■ News Server and Newsreader client ■ Firewall Security ■ And Many More Applications.

Your One-Stop Intranet Solution

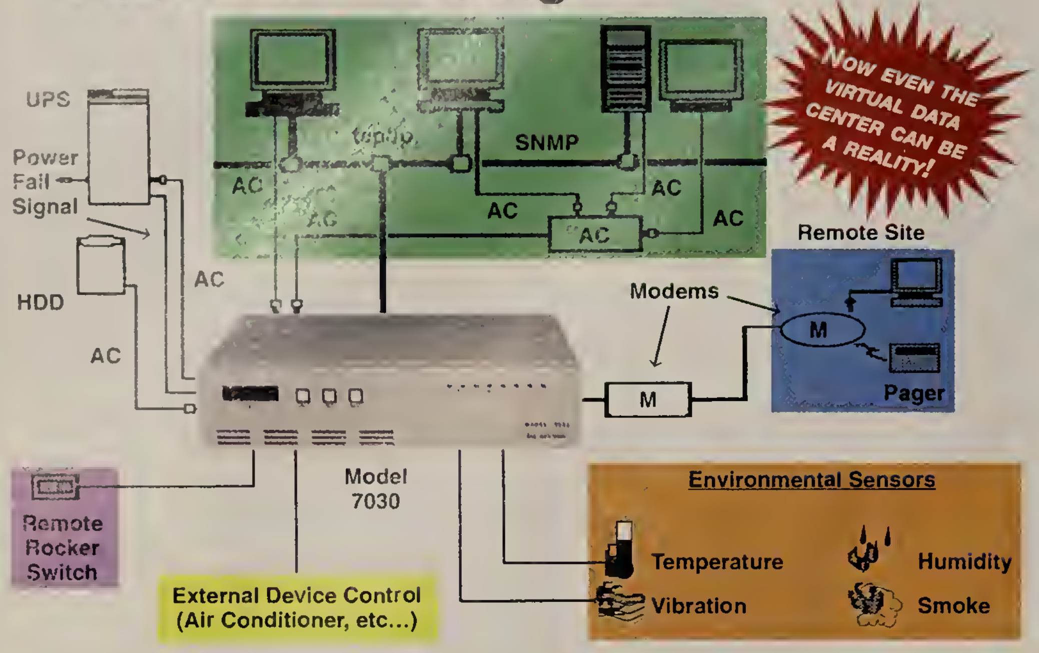
FRONTIER
TECHNOLOGIES

email info@frontiertech.com http://www.frontiertech.com ftp.frontiertech.com

© 1996 Frontier Technologies Corporation. All product names are Trademarks of their respective companies.

Reader Service No. 274

Save Money with Texas ISA's Ultimate UNIX Power Management Solution



Don't Buy Multiple UPS's For Your Computer Room Servers.

Add Advance Power Management Features (like graceful server shutdowns) To Your Existing UPS!

Benefits:

- Protects your existing UPS investment.
- Protects the OS and data from being corrupted.
- Increases the life of your computers and peripherals.
- Eases local and remote systems management.
- Eliminates unnecessary travel time to reboot hung systems.
- Simplifies large scale server shutdowns and startups.

http://www.texasisa.com

800-361-2256 / 713-493-9925
email: isasales@texasisa.com

Texas ISA
HP-IB & SCSI Storage, and Power Management Solutions

Reader Service No. 230

Certified Timeplex Equipment

Guaranteed Lowest Price for Certified Timeplex Equipment

All hardware is pre-tested and staged. If it doesn't say

ISO ascomTimeplex CERTIFIED

then it's not!

Sell • Warranty • Fast Turnaround

ALL TIMEPLEX EQUIPMENT

FDDI
LINK/2+
LINK/1
LINK/100
CSU
MICROLINK
MINILINK
ROUTERS
TIME/LAN
TIME/PATH
MICROPLEXER
OEM

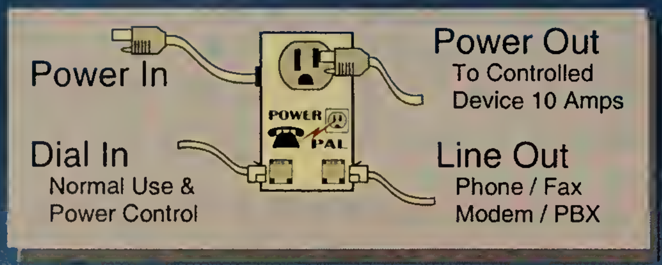
For information on our competitive prices, call

1-800-252-5416
or Fax: 1-800-762-7352

Reader Service No. 311

POWER PAL

Remote Power Controller



- Reset Remote Systems
- Reboot or On/Off
- Add to Any Phone Line
- Secure DTMF Control
- Transparent to Callers
- No Added Line Costs

Call or visit our Web Site for information on all our remote power control products

dataprobe
When Every Bit Counts

201.967.9300
sales@dataprobe.com
www.dataprobe.com

Reader Service No. 285

It's an Open and Shut Case...

for Great Lakes.

File Server and Data Cabinets designed to meet your Network Management storage requirements. We provide LAN Cabinets that feature solid metal frame construction and sophisticated modularity. Allow your Operating System to be the best!

Great Lakes preassembles cabinets to meet your exact specifications. Let us address your LAN environment applications using various 19", 23" and 24" rack mount widths, File Server Racks, Wall Mount Cabinets and Cable Management Systems.

- Value that counts
- Wide selection of features
- Preassembled to ease installation
- Guaranteed, on-time delivery
- Great Lakes Quality

Only Great Lakes can provide the fit, the quality and features you need on time.
Insist on Great Lakes Quality!

Great Lakes
case & cabinet co., Inc.

Corporate Headquarters:
P.O. Box 551, Edinboro, PA 16412
814/734-7303, Fax 814/734-3907

Western Distribution:
3875 Corsair Street, Suite "O", Reno, NV 89502
702/829-9913, Fax 702/829-9926

Reader Service No. 305

Fast Ethernet From Intel and West Hills

Completing The Fast Ethernet WorkGroup

Intel Introduces Switching Hub, Extending Fast Ethernet Leadership

Get the fastest total system performance for clients and servers over 10 and 100 Mbps Ethernet LANs. The Express Switching Hub increases the bandwidth of Fast Ethernet installations by dividing the network into segments. The Express Switching Hub is a Fast Ethernet store-and-forward switch with five 100Base-TX ports and two optional high-speed 100Base-TX/FX expansion ports. The Switching Hub provides Virtual LAN, supports Virtual Broadcast and Virtual Security domains.

The Express Stackable Hub combines the high performance of modular hubs with the low-cost and flexibility of stackable hubs.

Intel EtherExpress PRO/100
Smart Adapter
The intelligent, high performance server adapter
intel
Intel EtherExpress PRO/100
LAN Adapter
Give your Pentium processor-based PCs the network bandwidth they deserve
intel

The Express Hub has 12 100Base-TX ports and stackable up to six units, providing 72 ports in a single collision domain.

Intel EtherExpress PRO/100 Adapters and PRO/100 Smart Adapters extend the power of Pentium processor-based high-powered desktop systems and servers right onto the LAN. With a high performance 32-bit architecture for fast throughput and the industry's lowest CPU utilization, PRO/100 Adapters unplug all your network bottlenecks.

Switching Hub (ES100TX)		**$ 3,690.00**
Stackable Hub (EC100TX)		**$ 1,485.00**
PRO/100 Adapter (PILA8465B)	**Single**	**$ 132.00**
PRO/100 Adapter (PILA8465B)	**5-Pack**	**$ 580.00**
PRO/100 Adapter (PILA8465B)	**20-Pack**	**$2,195.00**
PRO/100 Smart Adapter (PILA8485)		**$ 705.00**

intel®

All other brand names are trademarks of their respective owners. © 1996 Intel Corporation

Intel and West Hills -- the leaders in Fast Ethernet

North American Office
7949 Woodley Avenue, Van Nuys, CA 91406
818/773-8171 •Fax 818/773-8932

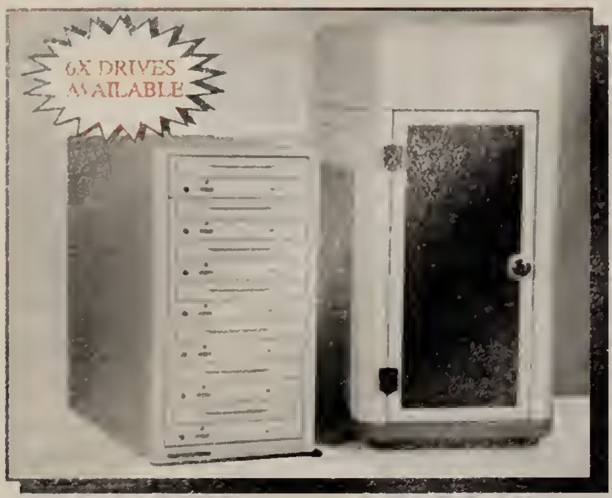
WEST HILLS
LAN SYSTEMS
800-FOR-LANS
800-367-5267

European Office
Yokneam Industrial Park, P.O. Box 1280 Yokneam 20692, ISRAEL
972-4-993-6264 • Fax 972-4-993-6230

Visa & MasterCard • Fast Delivery • Most Orders Ship The Same Day • Prices Subject To Change Without Notice

Reader Service No. 253

CD ROM TOWERS



4, 7, 14 and 28 Bay Towers
Servers and Rack Mounts

Toshiba, NEC, Plextor
and Sony Drives

Novell, Windows NT, Unix
and OS/2 Compatible

CD Management Software

2 Year Warranty

***EXCEL* COMPUTER**
SALES 800-995-1014
FAX 214-385-3299

Reader Service No. 235

FREE
Product Info

Remember to fill out your Reader Service Card in this issue!

The Switch Book

The Most Comprehensive Source on LAN Switches Currently Available. Over 150 Products.

What's Included

- Side-by-Side Product Profiles That Let You Compare and Contrast LAN Switches
- LAN Switch Vendor Analysis
- Technology Overview
- Market and Trends Analysis
- Summary Charts and Tables
- Detailed Pricing and Service

It would take you days, even weeks, of precious time and resources to research and assemble a product comparison that covers just a fraction of this 600-plus page analysis of the LAN switch market. We offer it to you along with valuable insight based on Mier Communications' lab testing and consulting experiences. Our reports are valued world-wide for their strategic insights into emerging network technologies, products and markets.

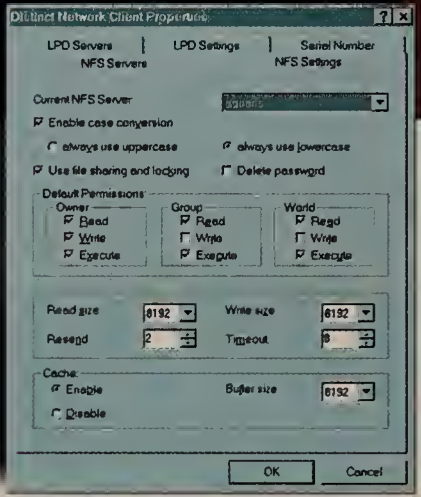
For more information call 1-800-MIERCOM

MIER Communications, Inc.
99 Hightstown Road, Princeton Junction, NJ 08550
Phone: 609-275-7311 ☎ Fax: 609-275-8813
http://www.mier.com

VISA MasterCard

Reader Service No. 288

Distinct NFS™ for Windows 95



Current NFS Server
☑ Enable case conversion
○ always use uppercase ● always use lowercase
☑ Use file sharing and locking ☐ Delete password
Default Permissions
Owner: ☑ Read ☑ Write ☑ Execute
Group: ☑ Read ☐ Write ☑ Execute
World: ☑ Read ☐ Write ☑ Execute
Read size 8192 Write size 8192
Resend 2 Timeout 8
Cache
● Enable
○ Disable
Buffer size 8192

Highlights:

- Integrates seamlessly into Windows 95
- Mounts NFS drives from Explorer or Network Neighbrhood
- Supports file and record locking
- Allows central authentication with a single server running PCNFSD for all NFS connectivity
- Prints to NFS or LPD print servers
- Allows login to all systems with a single login name and password or different login names for each system
- Allows single-operation logout of all systems accessed through Network Neighborhood
- Includes fine tune performance parameters for each server you access

Free Evaluation Copy Available at...

distinct
The world leader in Internet development tools.

408.366.8933
WWW: http://www.distinct.com
Fax: 408.366.0153
E-mail: networkw@distinct.com
Fastfacts: 408.366.2101

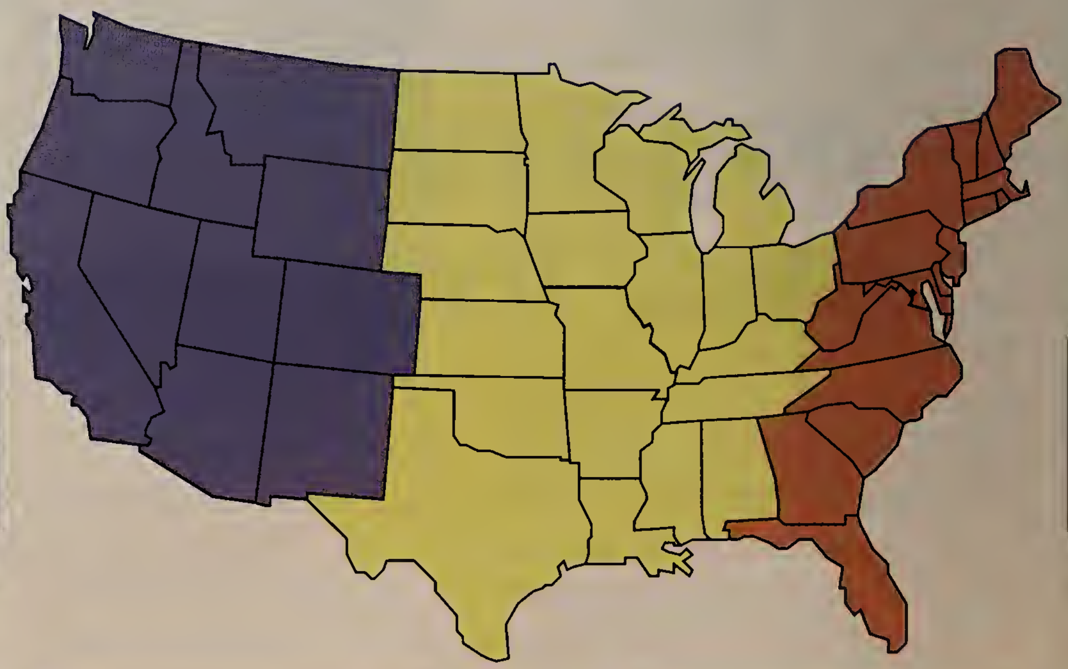
Distinct is a registered trademark and Distinct NFS is trademark of the Distinct Corporation. Copyright 1996 Distinct Corporation. 12900 Saratoga Avenue, Saratoga, CA 95070 Windows 95 is registered trademark of the respective corporations. All rights reserved. Specifications and terms are subject to change without notice.

Reader Service No. 314

DIRECT RESPONSE ADVERTISING

Sales Territory Map

Response Card Decks • Formatted Marketplace• WebWares



West
Clare O'Brien

East
Richard Black

Central
Heather Fairbanks

508-875-6400 or 800-622-1108

All column inch marketplace ads are handled by Carla Cappucci.

REFURBISHED

SynOptics®

Bay Networks

Largest Inventory of Refurbished SynOptics in America!

- SynOptics Trained
- SynOptics Authorized
- One Year Warranties
- Proven Track Record
- We Stock What We Sell!
- We Buy Used Equipment

CABLETRON SYSTEMS The Complete Networking Solution™ NOVELL 3Com IBM Wellfleet proteon

WE REPAIR ALL SYNOPTICS

National LAN Exchange

800-243-LANS
5 2 6 7

VISA MC

1403 W. 820 N. Provo, UT 84601 Voice 801-377-0074 FAX 801-377-0078

Circle Reader Service No. 231

Products purchased as a result of Marketplace ads.

- ✔ Hubs
- ✔ Routers
- ✔ Software training
- ✔ Memory products
- ✔ Ethernet Cards
- ✔ Netware products
- ✔ Modems
- ✔ Testing equipment
- ✔ Multiplexers
- ✔ File Servers
- ✔ etc.
- ✔ etc.
- ✔ etc.

XYPLEX

NEW & REFURBISHED

- Authorized Reseller
- Full Warranty
- Buy/Sell/Trade/Lease/Rent
- Entire product line including N9000 Hubs, Network 3000's, 4500/5000's (Chassis), add-on modules, 1500/1600 servers, plus much more!

1-800-832-6539

Fax: 612-832-0966 Voice: 612-832-9192

InterLink COMMUNICATIONS

5254 W. 74th Street; Minneapolis, MN 55439

Circle Reader Service No. 283

For More Information About Marketplace

1-800-622-1108

NOVELL NETWARE V4.1

*5 USER	$ 499
*10 USER	$ 999
*25 USER	$1299
*50 USER	$1499
*100 USER	$1899

250, 500, 1000 User and V3.12 call for price.

WE WILL BEAT OR MATCH ANY ADVERTISED PRICE

For more products visit us on-line
http://www.fcsnet.com
Prices are subject to change.

FIRST COMPUTER
1-800-325-1911

Circle Reader Service No. 277

VANDY MICRO ALWAYS NETWORKING!

100 Base-TX Fast ENET Hubs	
Ansel	
100BTX 8 port Hub	$695
Compex	
100BTX 8 port Hub	$895
3COM	
100BTX 12 port stack	$1,850
Networth	
100BTX 8 port hub	$995
10BT/100BTX 24 port	$3,490
Bay Network	
100BTX 12 port Hub	$1,580

10/100 ENET Switch	
Compex	
24 Port 10/100 Mbps UTP	$1,899
Bay Network	
10/100 Mbps UTP Sw	$9,000
Networth	
Fast Pipes 6 port hub	$3,495
Cisco	
CPW 1601A	$3,900

100 BaseTX Fast ENET Cards	
Ansel	
100/100BT PCI	$95
Compex	
10/100BT PCI	$125
3COM	
3C595 1/5/20	$149/660/2740
Intel	
PILA8465B- 1/5	$130/575
PILA8485	$700
SMC	
SMC 933DST	$190

Remote Access	
Asceno	
P25-1U-PX ISDN/IP Router	$625
P25-1U-RTR-CO-FX Router	$975
Cisco	
CPA1004A IP Router	$1,520
CPA2501A IP Router	$1,700
3COM	
3C8422 IP/IPX Router	$3,900

Bay Networks intel ciscopro 3Com

Promo Novell Specials	
4.1 - 5 User	$395
4.1 - 10 User	$795
4.1 - 25 User	$1,095
4.1 - 50 User	$1,595
4.1 - 100 User	$1,895
4.1 - 250 User	$ CALL

Managewise V2.0	
5 User	$495
10 User	$795
25 User	$1,195
50 User	$1,695
100 User	$2,385
250 User	$3,250

Promo Novell Specials	
3.12 - 5 User	$485
3.12 - 10 User	$995
3.12 - 25 User	$1,395
3.12 - 50 User	$1,895
3.12 - 100 User	$2,495
3.12 - 250 User	$ CALL

Netware for SAA V2.0	
SAA - 16 Session	$995
SAA - 64 Session	$2495
SAA - 128 Session	$3495
SAA - 254 Session	$4995

Visa/M.C./AMEX Corporate or School P.O.'s Welcome

NOVELL NW UPGRADES UP TO 65% OFF!

Vandy Micro Corp.
(800)373-2485
Fax:(714)768-1063 **EMAIL:** vandy5@ix.netcom.com
Prices and Specifications Subject to Change!

Circle Reader Service No. 241

For details on how to put your ad here

Carla Cappucci
1-800-622-1108

NETWORK HARDWARE

ROUTERS • HUBS • BRIDGES • MODEMS • MUXES
DSU/CSU • FRAME RELAY • T1 • ISDN

BUY/SELL/LEASE

CISCO

MOTOROLA • ASCEND • LIVINGSTON • 3COM
BAY NETWORKS • CISCO • ADTRAN • US ROB

800-230-6638

VISA Fax: 805-964-5649 MasterCard
email: usedcisco@aol.com

Network Hardware Resale, Inc.
1800 The Strand • Hermosa Beach, CA 90254

Circle Reader Service No. 244

GMM

GMM Sync+™

- Pentium™ Compatible
- 8 bytes FIFO
- 2/3 length card
- 85230 SCC chip
- Customer id (optional)
- 2, 3, 4, 5, 10, 11, 12 & 15 interrupt lines
- RS422, RS485, V.35 & RS530 chips (optional)

GMM Sync/PCI™ card available April 96.

GMM's Family of Products...
Intelligent 2, 4 & 8 port and an EISA card
Plus the ever popular GMM Sync™

Call for a free brochure today!
800-531-6145

17500 Redhill, Suite 250, Irvine, CA 92614
Tel (714) 752-9447 Fax (714) 752-7335
http://www.cerfnet.com/~gmmres/
e-mail: gmmres@cerfnet.com

GMM products made in the USA

COMMUNICATIONS BOARDS

Circle Reader Service No. 264

INTERNET SERVICE PROVIDERS & WEB HOSTS

IBM Internet Connection
(800) 455-5056 National
globalnetwork@info.ibm.com
SLIP, Leased Lines

New York Net
(718) 776-6811 NY/NJ/CT/PA/MA
sales@new-york.net
SLIP, PPP, Leased Lines, T1s, Frame Relay, 10Mbps

IMV Internet
(800) 241-7066 National
http://www.imvi.com
ONE FREE MONTH Web Hosting via DS3 connection with dual T1 backup. Shared server and co-location services; security; shell; Dev-Com; Easy Site.

InterNex Information Svcs.
(800) 595-3333 National
(408) 327-2388 California
info@internex.net
Web Hosting, CO-Location, Intl. Mirroring, Netcasting, ISDN, Frame Relay, T1, SMDS, T3, ESD

TIOcom
+(714) 348-2957 Worldwide
http://www.tio.com
sales@tio.com
WEB Hosting & Outsourcing

UUNET Tech. (AlterNet)
(800) 258-9690 National
info@uu.net
Web Srvrs, Frame Relay, ISDN, PPP, Leased Lines, Security, SLIP, UUCP

For information on listing your service here, contact Carla Cappucci at 800-622-1108 x465, ccapp@nww.com

---

NEW REFURBISHED BUY SELL NEW REFURBISHED BUY SELL

MSI Communications

Nationwide Services • 24-Hour Technical Support
CNE Services • Trade-In Credit

WAN Products
Adtran
AT&T Paradyne
BAT
Digital Link
INC
Micom
NET
Newbridge
Verilink

Distribution Products
Codex
GDC
IBM
Micom
Motorola
Racal Milgo
Spectron
Symplex
Tellabs
Timeplex
UDS
Vitalink

LAN Products
Bay Networks
Cisco
Compression Labs
Cubix
Develcon
Livingston
Madge
Novell
Xyplex

Specialized Products
Refurbished
CISCO SYSTEMS
AGS+, 2500's, 4000's, 7000's

Data, Voice & Video Networking
7 Waterloo Road, Stanhope, NJ 07874
TEL 201-347-3349 • FAX 201-347-7176
http://www.msic.com

An ESOP Company.....Where the Employees are Owners

Circle Reader Service No. 232

Intel PRO/100B $105*

Fast Ethernet

Intel 12-Port 100BTX Hub $1450*

*While Supplies Last

Fast Ethernet Adapters	
Intel EtherExpress PRO/100B PCI	$105
Microdyne 10/100 ISA	$125
Ethernet	
Relia PnP ISA/PCI Combo	$30/$49
Relia 10BT Hubs 8P/16Port	$79/$165

Fast Ethernet Hubs and Switches	
IntelExpress 12-Port	$1450
Bay Networks 12-Port	$1655
3Com Superstack II 12-Port (New!)	$1749
Networth 8,24-Port	$975/$2774
Networth 10/100 Dual Speed 24-Port	$3685
SMC 8,16-Port	$1150/$2300
Cisco 4,8,16-Port	$832/$1316/$2325
Switches (Intel/3Com/BayNetworks/Nbase/Compaq)	Call

Can't Find it? Let us help. If we don't have it we can get it for you!

CNet TOTAL NETWORK SOLUTIONS ASANTÉ intel. 3Com SMC COMPAQ NETELLIGENT NBASE COGENT Bay Networks D-Link Microdyne

S&A DISTRIBUTING

Call for Current Pricing! We will not be undersold!
Sales (801) 553-7249 Fax (801) 553-8031
We accept VISA MasterCard COD's, and qualified PO's

Circle Reader Service No. 309

LAN/WAN NEW/USED LAN/WAN NEW/USED

HUGE 3Com INVENTORY!!!

CABLETRON SYNOPTICS PROTEON BICC NETWORTH
CISCO NOVELL CHIPCOM INTEL SMC DCA IBM

WE BUY/SELL NEW/USED/EXCESS LAN/WAN STUFF

NEW 3Com SPECIALS	
509B-TPO	$70*
FMS 1 DEALS!	
8 PORT	$145
12 PORT	$250
24 PORT	$700
10 PORT CX	$1125
ADD SNMP ABOVE	$300
EAGLE 8 PORT	$100

*MINIMUM QTY 3

NIC DEALS	
509B-TPO 100PK	$5550
509B-COMBO	$95*
590 PCI TP	$100*
590-COMBO	$125*
595 TX-10/100	$130*
589C-TP PCM	$140
8 BIT TP	$30*

*MINIMUM QTY 3

ROUTERS

NETBUILDER I-II
REMOTE ACCESS
REMOTE OFFICE
CALL FOR PRICING!!!

NEW 3Com SPECIALS	
FMS II HUB	
12 PORT	$425
24 PORT	$775
ADD SNMP ABOVE	$425
8 PORT	$175

SWITCHES	
3Com 12 PORT	$2400
3Com 24 PORT	$3100
3Com 12 PT/ATM	$3800
SMC 6 PORT	$995
CNET 4 PORT	$650

LOTS MORE – CALL!

FAST ENET	
3Com 12 PORT	$1850
SMC 16 PORT	$2200
NETWORTH 8 PT	$1350

TOKEN RING (U)	
IBM8228	$95
IBM25F7367	$125
INTEL 8130	$130
PROT. 1390	$100
PROT. 1392	$135

MUCH MORE – CALL!

CABLETRON (U)	
TPMIM-24	$995
TPMIM-34	$1200
TPMIM	$350
TRMIM44A	$1800
TRMIM12	$600
TRRMIMA	$1400
THINMIM	$500
MT800	$125
2119	$45
CPT100	$50
2210	$45
EMME6	$2200
FR3000	$700
IRM2	$600
ETSMIM	$1200
FDMMIM4	$2600
FOMIM16	$900
FOMIM28	$1600
FOMIM22	$1300
M8PSM	$475
MMAC8FNB	$550
MMAC3FNB	$375

LOTS MORE!!!

3COM (U)	
FMS2 12	$375
FMS2 24	$650
FMS1 12	$325
FMS1 24	$550
ADD SNMP ABOVE	$300/200
509TP	$55
509COAX	$60
619 16/4 TKN	$125

NETBUILDER 1-2
LANPLEX/3GH
MSH/CS/IB/ECS
WAY TOO MUCH
TO LIST-CALL!!!

CHIPCOM (U)	
6010C-A	$1800
6017C-B	$2100
6000PS	$475
5006-C	$800
5017C-2	$1100
5108M-TP	$600
5101M	$1200
5000MRCTL	$1200

MORE-PLEASE CALL!!

SYNOPTICS PROTEON
NETWORTH CISCO
TOO MUCH TO LIST-PLEASE CALL!

NETWARE 3.12/4.1

5	10	25	50	100
$555	1150	1525	1795	2695

ERGONOMIC INC. 47 Werman Court • Plainview, NY 11803
Purch: 516-293-5200 • FAX: 516-293-5325

WE WARRANTY! WE BUY YOUR USED LANS/WANS QTY DISCOUNTS!

VISA/MC/AMEX
COD & Terms

FOR SALES ONLY CALL TOLL FREE OUR 14TH YEAR!
800-AKA-3Com (800-252-3266) U=Used

Circle Reader Service No. 271

NETWARE COMPETITIVE PRICES*

NOVELL # USER	Netware ver. 3.12	Netware ver. 4.1
5	495.	495.
10	995.	995.
25	1,495.	1,495.
50	1,995.	1,995.
100	2,795.	2,795.
250	Call	Call

NOVELL UPGRADE 60% OFF LIST

FREE
- FedEx 2nd day shipping (in US)
- CNE Support

yes It runs with NetWare

* Special Novell Promotional Packages-qualification required

Netware SAA v.2.0 / 16-session	$ 1,095.
Netware SAA v.2.0 / 64-session	$ 3,295.
Netware SAA v.2.0 / 128-session	$ 4,695.
Netware SAA v.2.0 / 254-session	$ 8,245.

BRING US YOUR BEST DEAL
WE'LL BEAT IT !!

- Hubs: 10Base-T, 100Base-T, 100VG-AnyLAN
- Adapters: 10Base-T, 100Base-T, PCMCIA
- Bridges • Repeaters • Transceivers • Cables...

WE CARRY A FULL LINE OF NETWORKING PRODUCTS FROM ALL MANUFACTURERS.

KEYNET CORPORATION

CALL US FOR ALL YOUR NETWORKING NEEDS!!!
(800) 307-5242
or Fax (714) 378-4757
http://www.keynet.com

WE ACCEPT
VISA • MASTERCARD
A.E. • P.O. • COD

* Prices are subject to change without prior notice.
* Novell & Netware are registered trademarks of Novell, Inc.

Circle Reader Service No. 263

INFORMATION DATA PRODUCTS CORP.

Modems
Multiplexers
DSU/CSU's
T-1/FT-1
Voice/Data
Bridges/Routers

New - Refurbished
"Data Communications Specialists"

1-800-362-3770
wan-info@planet.net
http://www.planet.net/idpc

Circle Reader Service No. 217

SAVE 50% & MORE ON MOST PRODUCTS
BUY/SELL/NEW/USED
RENT
Reconditioned With Warranty
Modems • Multiplexers • T-1
CSU/DSU's • Channel Banks

CSU/DSU, ALL RATE, V.35/RS232	$99
Newbridge Channel Banks	$2995
Micom Marathon 1K,5K,5K Turbo,10K	50% off
Kentrox T-Serv II	$499
T-1 CSU's	$350
Telco Systems Channel Banks	$2995
Newbridge 3600 Modules	CALL
Datatel DSU/CSU 56KBPS	$175
AT&T Channel Banks	$2995
Stat Muxes 4, 8, 16, 32, port	LOW
T-1 CSU/DSU V.35	$495
Channel Bank Rentals	$299/month

METROCOM
(800) 364-8838 or (713) 495-6500
FAX (713) 495-8449 24 HRS
HTTP://www.MetrocomInc.Com

Circle Reader Service No. 220

INTEROP INTEROP

Don't miss the September 16th issue of *Network World* with bonus distribution at NetWorld+INTEROP '96 in Atlanta!

Issue Closes: September 4th
Call Carla Cappucci
1-800-622-1108 ext. 465

NETWORLD+INTEROP'96
NetworkWorld

New

Configuring Cisco Routers

The only available Cisco computer-based training course

Course includes: Introduction to Cisco's Internetwork Operating System (IOS™), its functions, and commands

Using this course you will learn "How To"

√ Configure Cisco Routers for IP, IPX and bridging
√ Configure Cisco Routers for security using Access Lists
√ Use trouble-shooting techniques: pinging, trace routing and the use of TELNET access commands

Plus -- A Free LAN/WAN Technology Self Study Review Course.

General DataComm Service

Call Today . . . Be Ready For Tomorrow 1.800.475.3130

MasterCard/ Visa/ Amex accepted

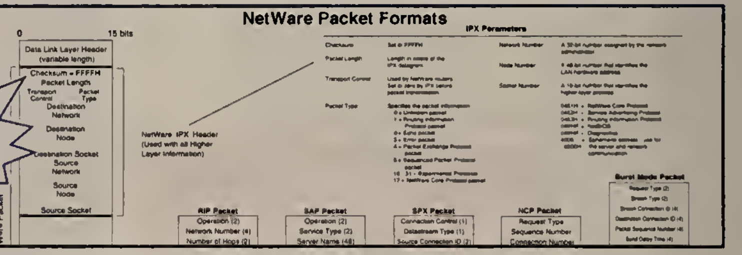
We're all you need to know

Cisco is a Trademark of Cisco Systems, Inc.

Circle Reader Service No. 310

Protocol Reference Guides

Only $5.95 each



Save valuable time troubleshooting your internetwork with these Reference Guides. Each laminated guide is 8 1/2" x 11", double-sided, and available for only $5.95 each, plus shipping. Titles include:

LANs
- Ethernet/IEEE 802.3
- FDDI
- Token Ring/IEEE 802.5
- LAN Cabling
- Physical Layer
- Data Communication

Architectures
- AppleTalk
- Banyan VINES
- DECnet Phase IV
- GOSIP version 2
- Novell Netware
- The Internet

WANs
- ATM
- Frame Relay
- ISDN
- SMDS
- SONET
- X.25

Net Mgt
- SNMPv1
- SNMPv2
- RMON
- NEW! RMON2
- WAN MIBs
- UNIX

Internets
- TCP/IP
- NEW! IPv6 (IPng)
- NEW! OSPF
- NEW! ISO IS-IS
- NEW! ISO ES-IS
- NEW! ISO TP/CLNP

Call Us for More Information and a Free Catalog
Hollister Associates • P.O. Box 575 • Lyons, CO 80540 • (303) 682-2634
Intcrnet: hollister@csn.net

Circle Reader Service No. 270

Attention IS and Procurement Managers!

ETHERNET NETWORK ADAPTERS	
3COM 3C509B-TPO TP Only Singles 5PK/20PK/60PK	89/399/1448/4016
3C590-TPO PCI TP Only Singles 5PK/20PK/60PK	112/508/1839/4999
INTEL EtherExpress Pro/10 PLUS TP Only Singles/5PK/20PK	84/374/1339
EtherExpress Pro/10 PCI Singles/5PK/20PK	129/566/2066

ETHERNET HUBS	
3COM FMS II 12TP or 24TP	495/875
BAY NETWORKS	
BayStack 12/24 TP Port	596/1021
HP AdvanceStack 12/24 TP Port	525/904

10/100 MBPS HUBS & ADAPTERS	
3COM 3C595-TX 10/100 PCI/5PK	144/656
3C250-TX-I FMS II 12 Port	1848
BAY NETWORKS 12 Port 100Base-TX	1582
NETWORTH 8 Port 100B-TX	854
CANARY 12 Port 100BaseTX	1311
CISCOPRO	
FastHub 100 TX 16 Port 100BaseTX	2538
FastHub 100 T/FX 15 100B-TX/1 FX.	3477
FastHub 100 FX 12 Port 100BaseFX	6181
INTEL EtherExpress Pro 10/100 PCI Single/5PK/20PK	133/623/2340

10/100 SWITCHING HUBS	
3COM 3C16900 LinkSwitch 1000 24 10BT and 1 100BaseTX Switched Port	3173
BAY NETWORKS	
AL1901001 BayStack 6 10BT Ports	1973
BayStack 6 10BT/1 100B-TX Slot	2830
28115 16 10/100 UTP Ports	11142
CISCO Catalyst 5000 Base Unit	9699
CISCOPRO	
1200 25 10BaseT/2 100BaseTX Ports	3502
2201 12 10/100 UTP/2 100BTX Ports	11259
INTEL ES100TX 5 100BaseTX Ports	3464
NPI FE-101 1 10BaseT/1 100B-TX Port	509
FE-105 5 10BaseT/1 100B-TX Port.	1134
FE-600 6 100 BaseTX Ports	2813

REMOTE ACCESS/ISDN/ MODEMS	
3COM Impact Ext. ISDN Modem	518
ASCEND Pipeline 25 w/NT1	612
Pipeline 50 w/U Interface	943
MAX 200 Plus ISDN BRI U Bundle	3017
CISCOPRO 2503B IP/IPX ISDN Router	2544
SHIVA LanRover/E 4.0 4/8 Port	2278/3345
LanRover/E Plus 4.0 4/8 Port	5379/7165
US ROBOTICS Sportster 28.8/V.34 Internal/External	171/184
Courier 28.8/V.34 19.2 Kbps Ext	289

BRIDGE/ROUTERS/CSU-DSU	
ADTRAN DSU 56/64K Switched w/V.35	264
TSU Single Port T1 CSU/DSU w/V.35	908
BAY NETWORKS	
ASN Stackable Router	2659
CISCO 2501 Ethernet/Dual Serial	822
2500 Series IOS IP Feature Set	1239
7000 Series Modular 7 Slot Base	12855
7000 IOS Enterprise Feature Set	3234
CISCOPRO 2501A IP Router	1712
2501B IP/IPX/AT Router	2017
COMPATIBLE SYS 1000R/2200R	1022/1440
MOTOROLA DA56 56K DSU/CSU w/V.35	198
FT100S T1 CSU/DSU w/V.35 Interface	908

AUDAX COMMUNICATIONS, INC.

1(800)589-8709
or fax (415)589-9100

New Equipment Only

© 1996

Call to order from our Dbase of over 850 vendors and 30,000 products • Call for CURRENT, quantity and rebate pricing • Government and Educational pricing available • Excellent overnight and 2-day freight rates

Visa, MasterCard and AMEX accepted.

850 Vendors & 30,000 Products at http://www.audaxcom.com

Circle Reader Service No. 290

Network Hardware
Affordable Quality
Since 1986

AT-Lan-Tec

8 port 100 tx HUB	$599
PCI 100 tx NIC	$79
NE2000 CB Jumpered	$ 39
NE2000 CB Jumperless	$ 29
PCI Combo Fast AMD	$ 79
PCI Combo Realtek	$ 39
Laptop Parallel 2 in 1	$ 79
PCMCIA Combo	$ 79
HUB 8 PORT RJ45	$109
HUB 16 PORT RJ45	$239

3COM

E-Link III 3c509B Combo	$79
E-Link III 3C509B TP or Cx	$59
PCI 3C590 Combo / TP	$ 119/$89
Fast E-link 10/100 PCI TP	$119

intel

EC100TX 12p HUB	$1450
PRO 100b PCI	$ 99

GENERIC 16b ISA COAX	$ 15
GENERIC 16b ISA COMBO	$ 17
GENERIC Hub 8-port	$ 69
GENERIC Hub 16-port	$139
GENERIC 100TX PCI NIC	$ 69
GENERIC 10mb PCI	$ 39

Call for Complete Catalog
800-847-4214
WWW.Atlantec.net

Circle Reader Service No. 299

USED CISCO DIRECT

➤Routers ➤Switches
➤Hubs ➤Modems
➤ISDN/ATM ➤NICS
➤T1 CSU/DSUs

CISCO SYSTEMS
WE BUY USED

➤Synoptics ➤3COM ➤IBM ➤Modge ➤Sun
➤Ascend ➤Cobletron ➤USRobotics ➤Shivo
➤Motorolo ➤Boy Networks ➤Livingston
➤ADC Kentrox ➤Intel ➤Newbridge ➤Adtron

m/Net
m/Net Communications Inc. 43-26 52nd Street Woodside NY 11377
Voice 718-565-3033, Fax 718-899-1019, Web www.mnetcom.com

DIGITAL WAREHOUSE
Your Information Superhighway Discount Source
1-800-553-4383

Circle Reader Service No. 259

LAN/WAN • BUY/SELL

MODEMS
DSU/CSU's
MULTIPLEXERS
T-1 EQUIPMENT
HUB, BRIDGES, ROUTERS, ETC.

FULLY WARRANTEED
NEW/REFURBISHED
RENTAL
LEASE

Fibermux Cabletron Synoptics
CISCO SPECIALISTS
AT&T Bay Networks

We carry all manufacturers, call John, ext. 101.

http://www.psyber.com/~adcs
PHONE
800-783-8979
FAX (916) 781-6962

ADCS INC.

Circle Reader Service No. 240

NETWORK WORLD, INC.

THE MEADOWS
161 WORCESTER ROAD, FRAMINGHAM, MA D17D1-9172
(5D8) 875-64DD/FAX: (5D8) 879-3167

Colin Ungaro, President/CEO
Evilee Thibeault, Senior Vice President/Publisher
Mary Kaye Newton, Assistant to the President
Eleni 8risbois, Sales Associate

ADMINISTRATION

Mary Fanning, Vice President Finance and Operations
Frank Coelho, Office Services Manager
Paul Mercer, Billing Manager
Mary Rinaldo, Telecommunications Administrator
Tom Garvey, Mailroom Supervisor
Tim DeMeo, Mailroom Assistant

HUMAN RESOURCES

Mary Cornetta 8rown, Human Resources Director
Danielle Volpe, Human Resources Assistant

MARKETING

Virginia Lehr, Director of Marketing
Kristin Wattu, Marketing/Promotions Manager
8arbara Sullivan, Market Research Analyst
Heidi Creighton, Public Relations Manager
Donna Kirkey, Marketing Design Manager
Nancy Vickers, Graphic Designer

GLOBAL PRODUCT SUPPORT CENTER

Joanne Wittren, Senior Global Marketing Services Manager
Jane Davey, Associate Global Marketing Services Manager

ADVERTISING OPERATIONS

Karen Wallace, Manager of Advertising Operations
Cathy Sampson, Sr. Advertising Account Coordinator
Ann Jordan, Advertising Account Coordinator
Marlo Matoska, Direct Response Ad Coordinator

PRODUCTION

Ann Finn, Production Director
Greg Morgan, Production Supervisor

RESEARCH

Ann MacKay, Research Director

CIRCULATION

Deborah Winders, Vice President Circulation
Richard Priante, Director of Circulation
Bobbie Cruse, Assistant Circulation Director
Mary McIntire, Circulation Assistant

IDG LIST RENTAL SERVICES

Christine Cahill, Sales Representative
P.O. Box 9151, Framingham, MA D17D1-9151
(8D0) 343-6474/(5D8) 37D-D825, FAX: (5D8) 37D-DD2D

PROFESSIONAL DEVELOPMENT GROUP

William Reinstein, Senior Vice President/Business Development
Debra Becker, Marketing Manager
Ann Roskey, Product Manager/Online Services
Ed Garabedian, Systems Specialist/Online Services
Christie Sears, Finance/Operations Manager
William Bernardi, Senior Product Specialist
Peter Halliday, Product Manager/NetDraw
Andrea D'Amato, Sales Manager/ Strategic Partnerships
Tina Pescaro, Operations Assistant
FAX: (5D8) 82D-1283

NETWORK INFORMATION/ DIGITAL IMAGING SERVICES

Jack McDonough, Network Director
Eric Powers, Network IS Support Specialist
Anne Nickinello, Digital Imaging Manager
Deborah McKenna, Imaging Specialist
FAX: (508) 875-3090

DISTRIBUTION

8ob Wescott, Distribution Manager

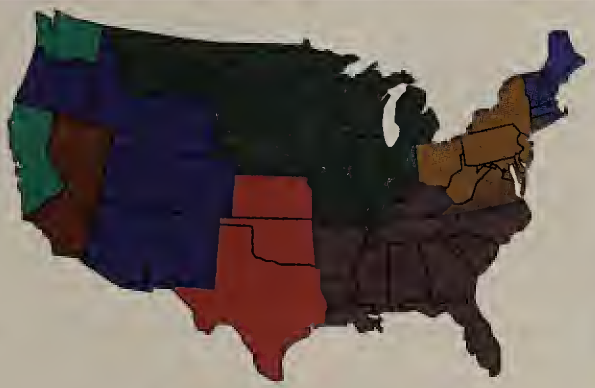
IDG

Patrick J. McGovern, Chairman of the Board **Kelly Conlin**, President **Jim Casella**, Chief Operating Officer **William P. Murphy**, Vice President Finance

Network World is a publication of IDG, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. IDG publishes over 275 computer publications in 75 countries. Ninety million people read one or more IDG publications each month. *Network World* contributes to the IDG News Service, offering the latest on domestic and international computer news.

SALES OFFICES

Carol Lasker, Advertising Director
Debbie Lovell, Sales Associate
161 Worcester Road, Framingham, MA 01701
(508) 875-6400/FAX: (508) 628-3976



NORTHEAST

Tom Davis, Eastern Regional Manager
Debbie Lovell, Sales Associate
Donna Pomponi, Senior District Manager
Nancy Robinson, District Manager
Jolene Springfield, Sales Assistant
161 Worcester Road, Framingham, MA 01701
(508) 875-6400/FAX: (508) 628-3976

MID-ATLANTIC

Jacqui Di8ianca, Senior District Manager
Rick Groves, District Manager, Sales Manager IntraNet Magazine
8arbara Stewart, Sales Assistant
351 E. Conestoga Road, Wayne, PA 19087
(610) 971-1530/FAX: (610) 975-0837

MIDWEST

8ob Mitchell, District Manager
Anna Caran, Sales Assistant
1011 E. Touhy Avenue, Suite 550, Des Plaines, IL 60018
(847) 297-8855/FAX: (847) 827-9159

CENTRAL

Dan Gentile, Midwest Regional Manager
Anna Caran, Sales Assistant
14205 Burnet Road, Suite 534, Austin, TX 78728
(512) 246-7044/FAX: (512) 246-7703

NORTHWEST

Sandra Kupiec, Western Regional Manager
Paula Connor, District Manager
Cynthia Schaeffer, District Manager
Carol Stiglic, Inside Sales Representative
8everly Davis, Sales Assistant
5201 Great America Parkway, Suite 440, Santa Clara, CA 95054
(408) 567-4150/FAX: (408) 567-4166

MOUNTAIN REGION

Mike Hiatt, District Manager
8rooke Daniels, Sales Assistant
One East Center Street, Suite 300, Provo, UT 84601
(801) 371-0625/FAX: (801) 371-0669

SOUTHWEST

Amy C. Bartulis, District Manager
Tracy Pennell, Sales Assistant
2171 Campus Drive, Suite 100, Irvine, CA 92715
(714) 250-3006/FAX: (714) 833-2857

SOUTHEAST

Don Seay, District Manager
Terry Sanders-Prentice, Sales Assistant
Lakeside Commons, 990 Hammond Drive,
Suite 600, Atlanta, GA 30328
(770) 394-0758/FAX: (770) 394-6354

DIRECT RESPONSE ADVERTISING

Response Card Decks/Marketplace

Joan 8ayon Pinsky, Director Direct Response Advertising
Clare O'8rien, Sales Manager
Richard 8lack, Account Executive
Carla Cappucci, Account Executive
Heather Fairbanks, Account Executive
Sharon Chin, Sales/Marketing Operations Coordinator
Chris Gibney, Sales Assistant
(508) 875-6400/FAX: (508) 628-3976

RECRUITMENT ADVERTISING

Pam Valentinas, Director of Recruitment Advertising
Tarjl Murray, Sales Associate
(508) 875-6400/FAX: (508) 820-0607

EDITORIAL INDEX

3Com 1,25,43,44,45

A
Acclaim 17
ADC Kentrox 18
ACC 43
AGIS 21
Aimnet 24
Ameritech 21
Amoco 24
Apertus 18
Ascom 8
Aspect 17
Associated Communications 10
ATML 6
AT&T 10,70

B
8ay 1,6,45
88N 24
8ell Atlantic 21
8oundless Technologies 6
8rooks Fiber Properties 21
8ulletproof 37

C
Cable & Wireless 24
Cabletron 1
Cisco 1,14
Compatible Systems 44
CSC 53
Concord Communications 21

D
Data General 15
Diamond Head Software 33
Digital 25,37
Digital Sound 18
DigitalFacades 33

E
Express 37

F
First Virtual 25
Fisher Technology 37

G
Global Village 49
GTE 21

H
HP 25

I
I8M 10,37
Infinite Technologies 6
Ipswitch 1
Isotro 1

L
Lightbridge 18
Livingston Enterprises 45
Lotus 6,33,40
Lucent 6

M
Madge 41
MCI 10,24
Microsoft 1,6,8,21,25,28,33,36,40

N
Netscape 1,36,37,40
NetSoft 17
NetSpeak 17
Nortel 37
Novell 8,40,49

O
OnStream 17
Optus 49
Oracle 6,33

P
Pac8ell 21
Pivotal 17
Powersoft 6
Precept 33
Proteon 45

Q
Quadritek 1

R
RightFAX 49
Rockwell 17
RSA 8

S
SAP America 14
S8C 21
Scitor 24
Security Dynamics 8
Siemens AG 18
Simba 33
SourceCom 45
Sprint 21
Sun 10
SunSoft 10
Sybase 33

T
Tandem Computers 17
Teloquent 17
Trans Union 18
Transition Networks 25
Trusted Information Systems 1

U
U.S. Robotics 17
US WEST 18
UUNET 24

V
VeriSign 37

X
Xylan 53

*Low-end routers Buyer's Guide vendor list begins on page 46.

ADVERTISER INDEX

Advertiser	Reader Service#	Page#
Adtran	43	51
ACC	56	29
Ascend Communications		2,3
Bay Networks	44	72
Compaq Computer Corp		26,27
Dell		12,13
Digex	45	28
Fore Systems	57	7
General Datacom	46	42
Hewlett Pacard		71
IBM		11,38
Intercon Systems	47	20
Memotec Communications	48	32
Nortel	54	23
Optical Data Systems	49	22
RAD Data Communictions	58	31
Softbank Communications		36
Sprint		4
Standard Micro Systems	59	15
Unisys		47
US Robotics	50,51	9,30
Verilink	60	18
Visual Networks	52	16
Xylogics	53	19

Regional/Demographic
Ads appear in selected issues.

3Com Corp	55	34,35

Marketplace	Reader Service#	Page#
Ascom Timeplex	311	62
C-Spec Corp	287	58
Carrier Access Corp	251	60
Castle Rock Computing	252	57
Dataprobe Inc	285	62
Distinct Corp	273,314	57,64
Eastern Research Inc	225	60
Excel Computer	235	64
Frontier Technologies	274	61
Great Lakes Case & Cabinet Co	305	62
Learnkey	275	57
Mier Communications	288	64
NHC Communications Inc	281	58
Rave Computer Association	302	60
Silicom Manufacturing	269	60
Technically Elite	247	58
Texas ISA	230	62
West Hills LAN Systems	253,297	59,63

Network World Fusion - www.nwfusion.com

Advertiser

Bay Networks	Nortel
Digital Equipment Corporation	Novell
In Focus	Sprint
Microsoft	Stratacom

These indexes are provided as a reader service. Although every effort has been made to make them as complete as possible, the publication does not assume liability for errors or omissions.

DIRECTORY OF SERVICES

NetworkWorld TECHNICAL SEMINARS

Network World Technical Seminars are one and two-day, intensive seminars in cities nationwide covering the latest networking technologies. All of our seminars are also available for customized on-site training. For complete and immediate information on our current seminar offerings, dial our instant fax-back service at 800-756-9430 from your touch tone phone or call a seminar representative at 800-643-4668.

NetDraw Clip Art for Building Networks ™

Diagram your network infrastructure quickly, effectively and professionally with *Network World's* NetDraw v3.0 and NetDraw Plus v2.0 software. At your fingertips, you will find over 1,100 full color, vendor specific network images in the areas of LAN's, WAN's, internetworking, personal computing and much more! New product features in NetDraw Plus v2.0 include "Smartdrawings" with built-in connect points, "Drag and Drop" drawing, multi-layered hierarchical diagramming and customizable image libraries. Call 800-643-4668 to order you copy today! Or get immediate fax-back information by dialing 800-756-9430 and request document code #10.

NetworkWorld REprints

Publicize your press coverage in *Network World* by ordering reprints of your editorial mentions. Reprints make great marketing materials and are available in quantities of 500 and up.

To order, contact Reprint Services at 612-582-3800 or 315 5th Ave. N.W., St. Paul, MN 55112.

*Our instant fax-back service delivers information on many of these products. Dial 800-756-9430 from your touch tone phone and use the appropriate document code to have information faxed right back to your fax machine!

Ipsilon

Continued from page 1

keting for high-end routing products. Analysts also expect Cisco to add NetFlow to its LAN switches next year.

Also joining the fray are Bay Networks, Inc. and 3Com Corp. These companies will roll out high-performance IP networking products later this year, and observers expect many more vendors to unfurl the "IP switching" banner when marketing their products.

"Now all of a sudden everyone has IP switching," said Eric Hindin, program director at market research firm The Yankee Group in Boston.

Many flavors

According to vendors, IP switching comes in many flavors. In its purest form, IP switching refers to the mapping of IP data flows onto connection-oriented virtual circuits, a technique designed to avoid the packet-by-packet processing overhead of routers. The rationale behind IP switching is to boost the performance of existing IP networks — such as the Internet — so they can handle increased traffic volumes, applications that require guaranteed QoS and multicast transmissions.

But industry pundits are divided over whether IP switching is a technological breakthrough or just a clever way to boost the performance of IP internetworking.

Indiana University's *Robel says Ipsilon's IP switching technology is a breakthrough.*

"Ipsilon's approach is, in a way, a breakthrough in that nobody really had figured out up to that point how to simplify this cut-through routing approach," said Allen Robel, senior network analyst for the computer services department at Indiana University in Bloomington. "In effect, the router becomes the control processor setting up VCs through the ATM switch."

Hindin said Ipsilon stands alone based on the technology used in its products.

"But I hesitate to use the term 'breakthrough' because the basic concepts [were considered by] the ATM Forum and lots of other vendors," he said. "It wasn't like Ipsilon came up with this and no one had ever heard of it; really they're just the first ones to implement it."

But they are not the only ones. This week, a group of about 20 vendors will test WAN IP switching interoperability and multicast operation using Ipsilon technology at MCNC, a nonprofit testing and research center in Research Triangle Park, N.C., said Larry Blair, vice president of marketing at Ipsilon.

For the LAN, Ipsilon's new FAS1200 subsystem is a 12-slot chassis housing modules that sport two Fast Ethernet ports and a single ATM link. The FAS1200 is an alternative to Ipsilon's current IP Switch Gateway configuration of personal computers with Fast Ethernet network interface cards.

The FAS1200 costs $4,900 per module and will ship in October.

Next month, Ipsilon will sponsor an IP Switching Solutions Showcase at NetWorld+Interop, Blair said. In this demo, vendors of servers and switches will display IP switching interoperability through the carrier cloud using Ipsilon technology.

"We will extend the definition of IP switching from the box to the network itself," Blair said.

Go with the NetFlow

Within the box is where Cisco's NetFlow Switching works. The technology — which analysts and users say is more of a routing tune-up than true IP switching — increases IP router performance by applying connection-oriented techniques to packet handling.

With NetFlow, routers inspect only the first packet in a flow, cache the service requirements for it and then apply this information to subsequent packets. The end result is higher performance IP routing (the performance of Cisco's 7500 router can scale to 1 million packets/sec from 500K packets/sec) because packet processing within a router is reduced, according to Cisco.

"They're caching more information than they had before in order to set up a shorter path through the router and a faster path through the router," said Indiana University's Robel.

These approaches seek to preserve users' investments in packet-based IP infrastructures while gradually migrating them to the cell-based ATM. But the IP switching and ATM worlds may not easily mesh, observers said.

"The problem with this as a migratory strategy is that it doesn't ever get you out of [IP]," said Thomas Nolle, president of CIMI Corp. in Voorhees, N.J. "It's not at all clear to me that if you wanted to do more than IP you could have the concept of IP switching coexist with ATM-specific networks, because the two don't know anything about one another."

It's getting crowded

Ipsilon and Cisco already have some company in the IP switching area and will soon have more.

Cabletron Systems, Inc.'s SecureFast Virtual Networking Services software establishes connection-oriented virtual circuits for a variety of network layer traffic in order to establish a cut-through mode of transmission through the network.

Bay and 3Com are also sizing up the IP switching opportunity.

"The notion of IP switching or just boosting the performance within the network is something we're very interested in, and we've been working on that stuff for way over a year," said Donal Byrne, Bay's director of enterprise architecture.

Bay is developing a Layer 3 switching software upgrade for its Centillion 100 switches that observers expect to be announced this fall. Bay is also developing high-performance Layer 3 switching products for establishing end-to-end QoS paths through the network using I-PNNI and the Resource Reservation Protocol.

"The distinction between routers and switches is blurring," Byrne said.

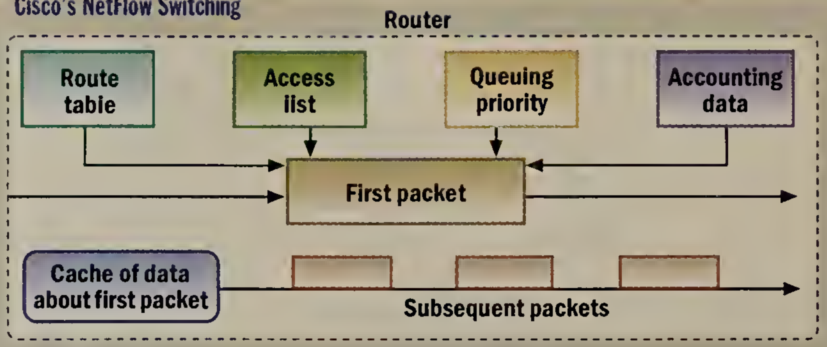
3Com is looking to increase the performance and scalability of its NetBuilder II routers, possibly by adding a switching matrix behind its modules.

"You should assume that we're at work to improve performance in NetBuilder II along a number of dimensions," said Jeff Thermond, 3Com vice-president of marketing. "We'll be making some announcements this fall."

As for the application of IP switching, Thermond sees definite benefits for IP multicasting, a method of replicating IP packets to a specific subset of network addresses. ■

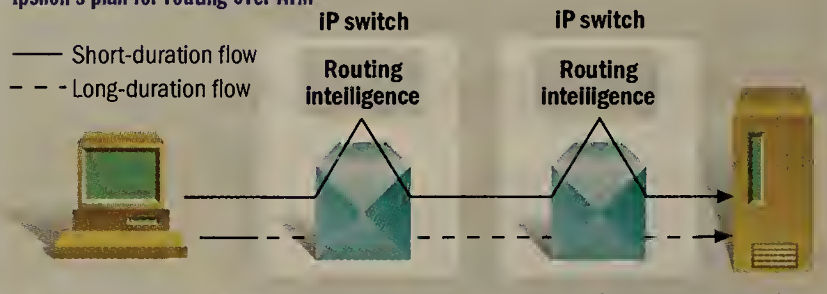
Ipsilon and Cisco: Two views of IP switching

Cisco's NetFlow Switching



NetFlow increases router performance by alleviating packet-by-packet processing. The first packet is processed thoroughly, then information gleaned from that process is cached and used to "switch" subsequent packets through the router quickly.

Ipsilon's plan for routing over ATM



Ipsilon outfits its ATM switches with routing intelligence that ships short-duration flows, such as E-mail messages, through each router; longer flows cut through the switch on ATM virtual circuits. Thus, the switch can exploit ATM performance features while maintaining IP compatibility.

Encryption

Continued from page 1

a key-escrow scheme that gives U.S. law enforcement access to a master key for decrypting IP datastreams.

The master key for each firewall will reside at Oakland, Calif.-based Source File, Inc., the third-party private key holder chosen under the government's groundbreaking plan.

Vice President Al Gore has supported the Defense Department's view that unbreakable encryption should be controlled because it is a powerful weapon and subject to misuse by criminals and terrorists. However, Gore recently said the government will allow mass export of 64-bit encryption products if they use key escrow. The agreement with TIS is the first evidence that the policy is being put into practice.

Until now, few companies other than banks could get the State Department and National Security Agency (NSA) to let them export 56-bit and higher Data Encryption Standard (DES) products. Only 40-bit products, easily broken with available computer resources, were allowed for mass-market export.

"We're on the verge of a major shift," said TIS President Steve Walker last week. TIS expects to unveil a raft of other vendors in the network industry that will license the TIS data recovery method for accessing data encrypted with a session key.

The government is also considering approving other third-party keyholders in addition to Source File, which has traditionally held source code in escrow on behalf of companies worried about the long-term viability of their suppliers.

Just say no

Not all are key-escrow converts, however. In fact, it is painfully clear that corporations will continue to balk at the prospect of their encryption keys being held by a third party or the government.

Netherlands-based Royal Dutch Petroleum Co., with hundreds of subsidiaries and offices all over the world, is looking to ditch dedicated private lines and send encrypted IP traffic over the Internet instead.

The State Department's mass-market license for the Gauntlet means TIS can compete to provide Royal Dutch Petroleum with its encrypting firewall. But Homayoon Tajalli, TIS vice president, acknowledged that the Dutch oil conglomerate is unwilling to hand its encryption keys over to Source File.

Hence, as part of negotiations with the U.S. and Dutch governments, Royal Dutch Petroleum agreed to operate its own data recovery center for the Gauntlet master keys. Royal Dutch Petroleum would hand over the master encryption keys to Dutch law enforcement, which in turn would give the keys to U.S. authorities "if the government shows up with a valid warrant," Tajalli said.

TIS went to great lengths to broker the international arrangement, and hopes that not every firewall export will entail such laborious negotiations.

Some firewall users are extremely ambiguous about the government's key-escrow plan.

"I'm not sure I want the government to have that ability," said Doug Miller, information systems manager at Bluestone Corp. "At all cost, we've got to keep the government out of business operations." ■

Netscape

Continued from page 1

As of last week, plans called for the official announcement to be made on Sept. 9. Netscape declined to comment.

"These are core applications that do the basic things you want to do in a corporate intranet," said a source familiar with Netscape's plans. "It's the sort of stuff people wish they didn't have to write from scratch."

With the sales trend analyzer application from Lante Corp. of Chicago, a field sales representative using a Web browser could call up his company's Internet/intranet server and tap into a customer's purchasing record from the road.

"It's basically a simplistic type of application that would be easy to do if you had a sales force automation product and were online," one source said. "It's just that you could do it via the Web."

Many of the applications originally were designed for specific customers, and because of that, they may have to be tweaked for use in different network environments, one source said. As a result, some like to call them templates. Another source disputed calling them templates, preferring to describe them as light versions or modules of richer applications.

NetworkWorld Fusion

Check the latest product and strategy moves by Netscape and Microsoft on Network World Fusion. (http://nwfusion.com). Select News+.

In any case, since Netscape is distributing the source code, customers can modify the mini-applications to suit their needs, sources said.

To help in that regard, Netscape also will be giving away trial versions of application development tools from a variety of companies, including Symantec Corp. and Silicon Graphics, Inc., sources said.

But the assumption is that serious corporate customers will want to contact the applications vendors to buy the full-blown applications, rather than tinker with the mini-applications. "They'll want more than just a starter app, and they'll want support," said one source familiar with Appalanche.

Many of the third-party vendors in the Appalanche program are small, lesser-known companies that could use exposure, and Netscape is opening up a channel for their products, sources said.

Netscape, in turn, gives its customers a business reason to buy its Web servers and clients.

"It's more evangelical work on their part, saying, 'Here, you can do real [business work] on this Internet and the Web,'" one source said.

Those familiar with the Appalanche package said they see the products competing with third-party offerings designed to run with Microsoft's BackOffice and Lotus Notes.

"Corporate America won't dump their current application platform for this," said Stan Lepeak, an analyst with the Stamford, Conn.-based META Group, Inc., when presented with the Appalanche scenario. "It'll help keep people that are already with Netscape. But Microsoft shops won't throw everything out the window and rush to Netscape."

The free Appalanche suite will be available for download from Netscape's Web site. It will also be available on CD-ROM, sources said. ■

Vienna

Continued from page 14

ACSI's private frame relay network to handle on-net voice calls and give employees at remote offices access to voice mail housed in the headquarters PBX.

Advanced Multi-Point Conferencing, Inc., also based in Kanata, Ontario, is thinking about using the Vienna.com platform to support a simultaneous voice/data conferencing service over one line, according to Mark Kelly, the company's vice president of technology.

The Canadian Department of Industry is also considering the Vienna.com system for voice/data conferencing, so workers can view the same data screen and talk at the same time.

The Vienna.com client software ($60 per seat), the basic server ($12,000) and an eight-port BRI ISDN interface ($2,500) for access to the PSTN will ship next month. A $2,500 dual T-1 interface is due out in December.

☎Vienna: (613) 591-3219.

In-Site

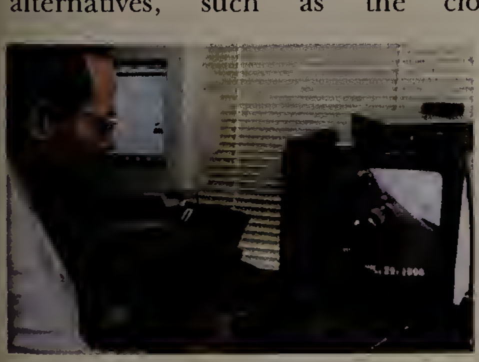
Bassett

Continued from page 1

long-distance companies, LEC switched access charges as much as 4 cents a minute force them to add tens of billions of dollars to phone bills.

This twist on the burgeoning use of voice over frame relay and ATM was devised by Middleton and implemented in May with help from Northern Telecom, Inc. and its Magellan Passport switches, which anchor Bassett's private network.

Now Bassett is carrying 120,000 minutes of traffic a month at rates more than 12% below the lowest bid Middleton received for more traditional alternatives, such as the national long-distance carriers' virtual private networks.



Bassett's *network handles patient registration, medical records and voice traffic.*

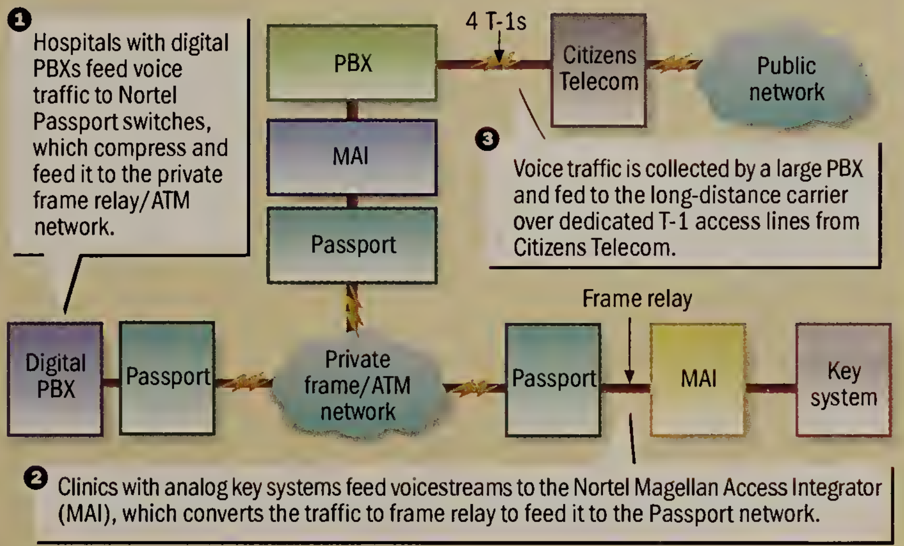
While VPNs offer attractive rates for calls between two locations with dedicated access lines, the rates rise significantly if one or the other is a smaller location with switched access, or if the call is to an off-net location. And Bassett — a chain of 21 hospitals and clinics based here — has many rural locations that cannot justify the use of expensive dedicated access lines.

Middleton did not set out to find a way to get out from under the telephone industry's ongoing intramural squabble about switched access.

He just wanted to replace an existing WAN built on a combination of point-to-point private lines and switched 56K bit/sec circuits. And as a largely rural health care organization looking closely at telemedicine for remote diagnostics and consultations, he wanted a network that could economically handle prosaic LAN-to-LAN traffic and scale up to carry bandwidth-intensive medical images.

Directing voice traffic at Bassett

By routing voice traffic over its frame relay/ATM network, Bassett avoids expensive local switched access lines.



❶ Hospitals with digital PBXs feed voice traffic to Nortel Passport switches, which compress and feed it to the private frame relay/ATM network.

❷ Clinics with analog key systems feed voicestreams to the Nortel Magellan Access Integrator (MAI), which converts the traffic to frame relay to feed it to the Passport network.

❸ Voice traffic is collected by a large PBX and fed to the long-distance carrier over dedicated T-1 access lines from Citizens Telecom.

That's when he encountered his first problem: access to carrier points of presence with fast-packet data switches. Even AT&T's closest frame relay POPs are located in Albany and Syracuse.

But going to a private network was not a snap decision, either. Middleton did not want to have to sacrifice an ATM future for telemedicine by locking into frame relay customer premises equipment.

In addition, while Bassett's electronic medical records system is a TCP/IP application, Middleton wanted to retain Bassett's legacy patient registration system based on Digital Equipment Corp.'s timeout-sensitive Local Area Transport (LAT) protocol.

That led Middleton to Nortel's Magellan Passport enterprise network switches, which support a variety of protocols on both the LAN and WAN sides, including the nonroutable LAT protocol through a terminal server.

"For LAT, we could bridge, but for other protocols, we could route," he said.

And Middleton knew that, using prioritization and silence suppression, Passport could interleave voice traffic fed to it by a digital PBX with data and video onto ATM circuits.

But Passport on its own does not currently ship voice over frame relay, and many of Bassett's smaller locations have older analog PBX or key systems that would not be able to communicate with Passport.

The kicker came when Nortel earlier this year purchased Micom Communications Corp. of Simi Valley, Calif., and relabeled Micom's Marathon line of voice/data integration boxes the Magellan Access Integrator. Those boxes compress ordinary 64K bit/sec voice traffic as low as 8K bit/sec and then feed it through a frame relay interface to the Passport switch. ■

NetworkWorld
161 Worcester Road
Framingham, Mass. 01701-9172
(508) 875-6400

Periodicals postage paid at Framingham, Mass., and additional mailing offices. Posted under Canadian International Publication agreement #0385662. *Network World* (ISSN 0887-7661) is published weekly, except for a single combined issue for the last week in December and the first week in January by *Network World*, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Nonqualified subscribers: $5.00 a copy; U.S. - $129 a year (except Washington, DC, Utah and Florida $136.74); Canada - $160.50 (including 7% GST, GST #126659952); Central & South America - $150 a year (surface mail); Europe - $205 a year (surface mail), all other countries - $300 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label from front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zebb Road, Ann Arbor, Mich. 48106.

Network World is distributed free of charge in the U.S. to qualified management or professionals who meet ALL of the following criteria:

1) Have site purchasing influence.
2) Are involved in the purchase of network products and services.
3) Have multi-platform networks installed or planned (including network architectures, LAN operating systems and LAN environments).

PHOTOCOPY RIGHTS: Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Network World, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus 50 cents per page is paid to Copyright Clearance Center, 27 Congress Street, Salem, Mass. 01970.

POSTMASTER: Send Change of Address to *Network World*, P.O. Box 3090, Northbrook, IL 60065.

Copyright 1996 by *Network World*, Inc. All rights reserved. Reproduction of material appearing in *Network World* is forbidden without written permission.

BPA INTERNATIONAL
RED TAG

Reprints (minimum 500 copies) and permission to reprint may be purchased from Reprint Services, 315 5th Ave. N.W., St. Paul, MN 55112 (612) 582-3800.

USPS 735-730

Why computer systems are bad at the stuff they are supposed to be good at

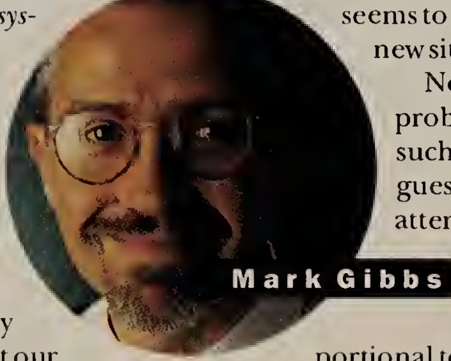
Computers are not very good for the one thing we want them for: data retrieval and display. (''Mon dieu, thees ees ze sacrilege,'' I imagine you saying, perhaps because I am writing this in a hotel room in France. I suggest you drop the lousy accent before we both get into trouble.)

At the heart of this problem are three factors that few information professionals allow for in the design of systems: the expectation of users of a ''frictionless'' computing environment, the poor display characteristics of even expensive monitors, and our culture's ever-decreasing attention span.

We talk so glibly about ''ease of use'' that real, honest-to-goodness users think we mean that computers *really* will be easy to use.

But users *reading a manual?* Users actually *learning the system?* Of course not, computers are easy to use . . . aren't they?

No, they are not.



Mark Gibbs

But the myth of ease of use, of a lack of friction in the things we expect to do with computers, permeates not only the computer industry but our culture, as well. Combine that with the common perception of computers being increasingly powerful and our expectations become stratospheric.

In one sense, this is good: It helps drive the computer industry and is both a goad and a goal for vendors. But back at the sharp end, the user's enormous expectations quickly make every advance in power and every usability improvement transparent and turn state of the art into ''I need to upgrade'' almost as soon as the computer is out of the box.

Just consider: You load the spreadsheet that you couldn't even run on last year's computer on your 200-MHz PentiumPro with 64M bytes of RAM under Windows 95, and if it takes two microseconds longer than you feel is acceptable you start looking for upgrades. Forget the fact that today's unacceptable performance is last week's impossible operation.

Now consider the monitor. The vast majority of monitors display at around 76 dots per inch (dpi). If I show you 300-dpi laser printer output, you'll probably say it looks ragged. But 76 dpi? Even the best monitors only display at around 100 dpi.

Video and audio are going to explode on your network.

Add to that the inherent flicker of the monitor that makes your eyes tremble very, very slightly, but enough to tire the eye muscles.

Given the above facts, are you surprised that your eyes fatigue quickly and that ergonomics experts recommend taking a break every 15 minutes when you use a computer?

My final point concerns the attention span of the average user. For whatever reason, the average individual's ability to focus on a task, particularly something as intellectually demanding as reading, seems to become less with every new sitcom.

Not that I'm blaming the problem on television as such. I can only hazard a guess at the cause of short attention spans, what with the ratings of popular TV shows appearing to be inversely proportional to intelligent content. Call me old-fashioned, but programming that could cause brain damage to a brick must have an impact if consumed in large enough quantities. But I digress.

The result of all these forces is that if you want to get people to actually comprehend material presented on a computer system, then you'd better consider the design of the user interface and the architecture of the data.

It is for these reasons that video and audio are going to explode on your network. That is, if you are going to make the complex data of the 21st century useful to the broadest range of users.

So best of luck. Until computer vendors come up with systems that are orders of magnitude better at doing what they are intended to do, you better engineer your systems to allow for ridiculous user expectations, poor displays and short attention spans.

What's your favorite sitcom and does it make your head hurt? Tell Gibbs at mgibbs@gibbs.com or (800) 622-1108, Ext. 504.

Execs dreaming of riches put product quality at risk

The trend of technology executives like Alex Mandl defecting to start-up companies for megabucks pay is great — for them. As for users, the trend risks triggering a decline of quality that complicates buying networking products and services.

Former AT&T President Mandl's recent resignation must have hit his boss like a Mike Tyson blow to the gut. Whether corporate titan or mere department head, you dread that fateful moment when No. 2 pokes his head into your office and asks, ''Hi. Got a minute?''

Dave Buerger

It gets worse when the soon-to-be-former confidant states his new compensation. ''Damn,'' you think, ''that's more than mine!'' Suppressing jealousy, you mumble something about the difficulty of a counteroffer and, poof — he's gone.

Mandl's gamble on Associated Communications, L.L.C., a wireless start-up in Washington, D.C., could make him a centimillionaire. His $20 million signing bonus is an incredible start. But fast switches in corporate loyalty (such as Mandl's) clearly make some network managers question the long-term status of a supplier, even if it is AT&T.

Trust is crucial when spending corporate money. Buyers want suppliers to be stable, innovative and fair.

Trust is crucial when you spend big corporate money. Buyers want suppliers to be stable, attentive, innovative and fair.

It's stupid, however, to trust a corporation. A corporation is just a piece of paper. Logically, you should trust people, not paper. But when the people you know leave — especially a key supplier's executives — trust has to be rebuilt.

Executive turnover among technology vendors is now quite common. Many executives have finally forsaken loyalty to their corporations. And why not? Trusting souls get burned when directors or the CEO whack their jobs after a merger or a bad quarter. Executives have personally learned what their employees knew: Loyalty is a one-way street.

AT&T has had other high-level defections. Jerre Stead and James Barksdale reaped millions from new entrepreneurial opportunities. Elsewhere, George Fisher and Louis Gerstner are among many who earned extra millions by taking an outside chance.

Big money, however, usually is not earned from signing bonuses; it comes from soaring stock prices that swell the value of options granted to executives.

These days, big talent requires big compensation. And as we've seen, executives do not have to run a big company to hit the jackpot.

There is nothing particularly sinister about this new game of executive musical chairs. It's simply another side of capitalism, where scarce talent demands a big price. The heightened frequency of this practice, however, poses a new challenge to maintaining trust between buyer and seller.

Technology executives are human. They see associates leave and make millions on new ventures. They also know time is short. Mandl, for instance, did not want to wait four more years for his boss to relinquish the CEO title. Four years is an eternity in this business. Mandl bet that it's quicker to succeed outside AT&T.

Such thinking means ambitious executives in slower growth firms aren't as focused as they could be. Their dreams of earning new wealth are elsewhere.

And that spells trouble if they expect to lead their troops to ever-higher levels of product innovation and quality.

This is a bigger problem with established companies, not start-ups. People still buy lots of products from established companies, so inattention to quality and service can have widespread effects. Many buyers, for instance, are eager for alternatives to local phone companies.

Consider assessing the flight of top talent from a vendor. Examine its financial statements. Growth potential is the key to a rising stock price.

And that's mainly what holds the long-term interest of executives. You may not like this new world, but adapting to it will help to minimize damage. Don't blame Alex Mandl for grabbing the dough. Wouldn't you?

Buerger is a networking industry consultant and writer in Atlanta. He can be reached at dave@buerger.com.

HP NETSERVERS
HEWLETT PACKARD NetServer 5/100
LAN 1996 PRODUCTS OF THE YEAR
PC MAGAZINE EDITORS' CHOICE March 26, 1996 HP NetServer 5/133 LH
PC Computing BEST
Computer Reseller News CHANNEL CHAMPION 1995
EDITOR REFUSES TO GIVE IT BACK NETWORK COMPUTING
MVP PC Computing
intel inside pentium PROCESSOR

THANKS.

Let's be honest. Having our NetServers showered with accolades is a kick.

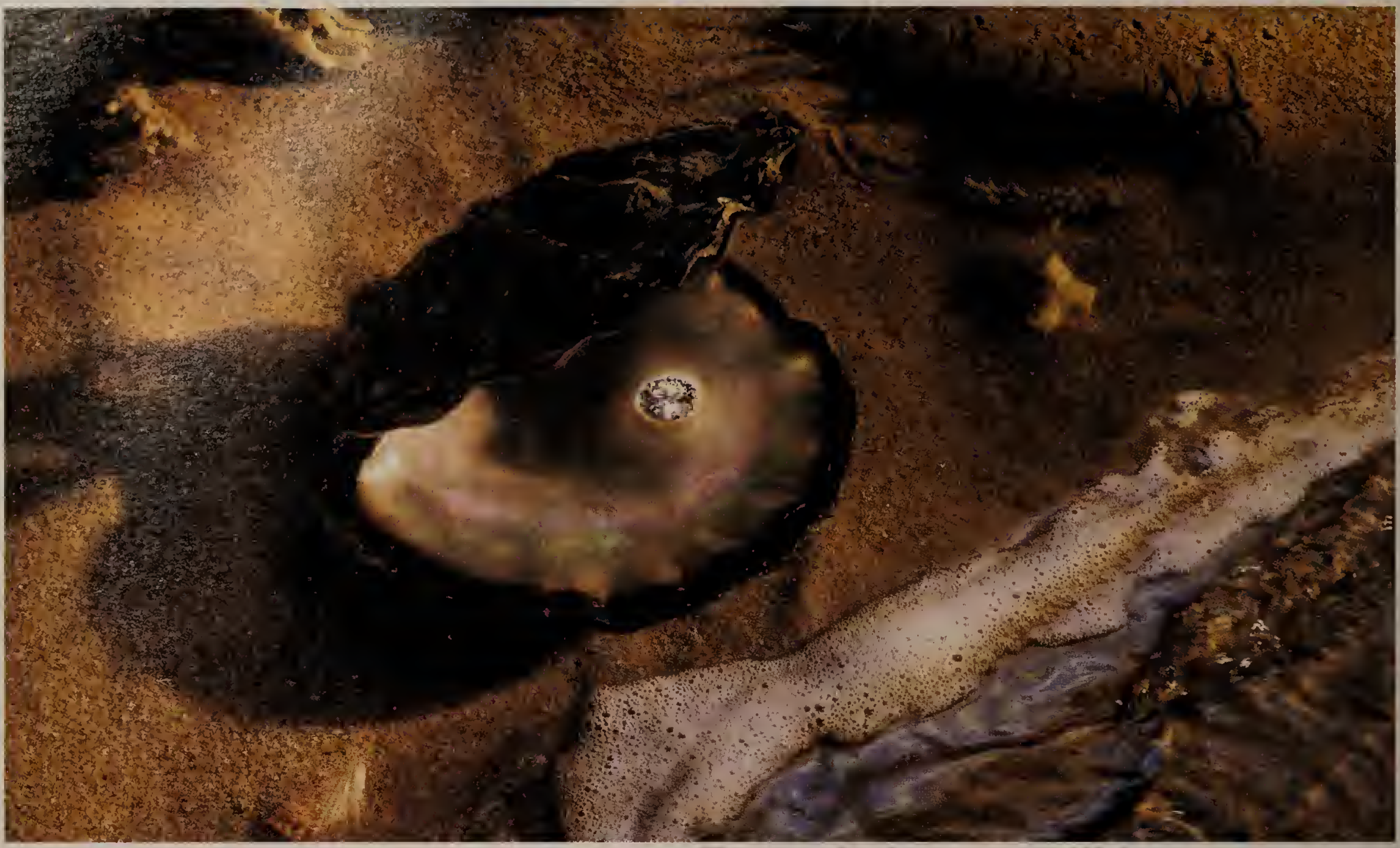
Besides, it shows how serious we are about building quality network systems.

For detailed specs, visit http://www.hp.com/go/netserver. Or call 1-800-533-1333, Ext. 1688.

Pictured: the HP NetServer 5/100 LH. Awards shown: *PC Magazine* Editors' Choice HP NetServer 5/133 LH; *PC Computing* BEST HP NetServer 5/133 LS2; *LAN Magazine* Products of the Year HP NetServer LS Series; *Network Computing* Editor Refuses to Give it Back Award HP NetServer 5/100 LS4; *PC Computing* MVP HP NetServer 5/100 LH; *Computer Reseller News* Channel Champion Award NetServer Series. The Intel Inside logo and Pentium are registered trademarks of Intel Corp. ©1996 Hewlett-Packard Company PPG433

HEWLETT® PACKARD

We Always Try To Over Deliver.



Something you can count on from the leader in seven out of ten networking categories.

Nobody knows networks like we do. And, judging from our number one market share in seven out of ten networking categories, nobody builds them as well as we do, either.

You owe it to yourself to talk to Bay Networks. We're the source for building a complete, standards-based network that grows with you—whether you need switching, shared media, routing, or remote access. Or all of the above.

With Optivity® network management, you ensure the overall integrity of your network. And with Bay Networks, you get 7x24 global support for your entire network.

So visit our Web site at www.baynetworks.com or call 1-800-8-BAYNET, ext. 95 for a worldwide market share comparison. And see how Bay Networks can deliver more to your network.

BAY NETWORKS
WORLDWIDE MARKET SHARE

NETWORK MANAGEMENT	
Windows/DOS	#1
UNIX	#1
RMON	#1
HUBS	
Ethernet	#1
Token Ring	#1
SWITCHES	
Token Ring	#1
Ethernet	#2
ATM	#2
ROUTERS	#2
REMOTE ACCESS	#1

Source: Recently published reports from Dataquest, IDC, and/or Dell'Oro Group.

© 1996 Bay Networks, Inc. "People connect with us" is a trademark of Bay Networks, Inc.

Circle Reader Service #44

Bay Networks
People connect with us